Scientific American.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. X.—No. 7. (NEW SERIES.) NEW YORK, FEBRUARY 13, 1864. SINGLE COPIES SIX CENTS. $3 PER ANNUM—IN ADVANCE.

Improved Marine Clock and Register.

In order to tell the exact number of revolutions made by any machine it is necessary to have a self-registering counter which shall accurately record every stroke made by the engine or other machine to which it is attached. By this means the distance traveled by a steamship can be approximately ascertained. The log of the engine being compared with that of the ship affords some data for estimating the duty done by the machinery. The engravings herewith illustrated represent a marine clock and indicator, or engine register, combined in one case, A. The small disks, B, have numbers on their faces and are all fastened to the shaft, C; this shaft is worked from the engine by the arm, F. The frame, D, carries all the disks, and, by means of appropriate devices not seen in the engraving, the disks are caused to rotate and stop for every stroke of the engine; this concealed apparatus acts on the jogs, *a*, to produce this effect. When the register is first set, all the disks are turned at 0, so that they represent nothing, numerically, through the small square loop holes in the clock dial. As the engine makes one revolution the left hand disk also turns and registers 1; when 9 turns have been made, the disk next to the first turns with it; thus registering 10; the first disk then goes on again while the second one stops, thus counting up to 19, when the second one turns again counting 20, and this continues until the whole number of disks have been turned. The other appurtenances, such as the clock movement, E, are very highly finished and there is a fixed handle at G by which the works are wound up as it becomes necessary to do so. This handle is so connected with a ratchet wheel and pawl that, as it is worked back and forth, the spring moving the clock works is wound up; those details are behind the dial enclosed in the box, E, and cannot be shown; there is also another arrangement of a pinion, in connection with the hands, which, together with the previously-mentioned winding handle, constitute a great improvement in marine winding clocks. This invention was patented on Nov. 3, 1863, through the Scientific American Patent Agency, by Victor Giroud, New York City. Further information can be obtained by addressing Davison, Dickinson & Co., 229 Broadway, New York.

Fig. 1.

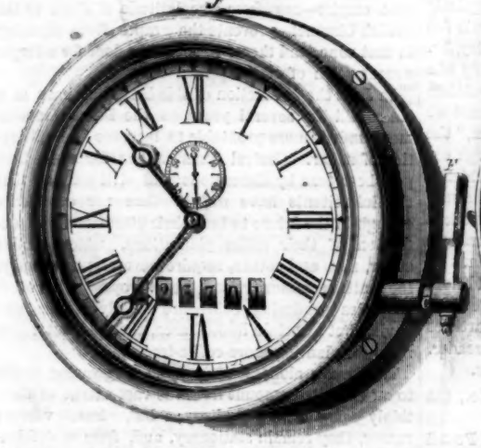
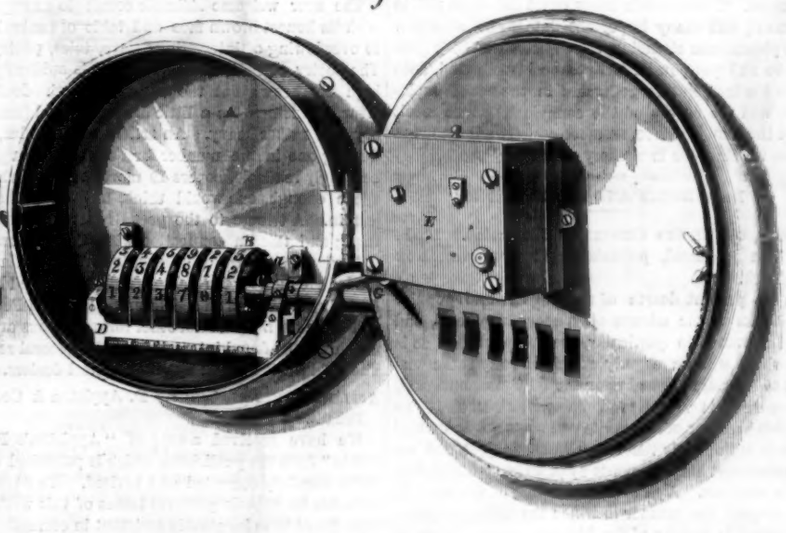


Fig. 2.



GIROUD'S MARINE CLOCK AND REGISTER.

GUN-COTTON FOR CANNON.

At the last anniversary meeting of the Royal Society of England, in the President's Address, delivered by Major-General Sabine, are the following remarks on gun-cotton:—

"The application of gun-cotton to warlike purposes and engineering operations, and the recent improvements in its manufacture, have been the subject of a report prepared by a joint committee of the chemical and mechanical sections of the British Association, consisting chiefly of Fellows of the Royal Society. The report was presented at the meeting in Newcastle in September last, and is now in the press. The committee had the advantage of personal communication with General von Lenk, of the Imperial Austrian Artillery, the inventor of the system of preparation and adaptation by which gun-cotton has been made practically available for warlike purposes in the Austrian service. On the invitation of the Committee, and with the very liberal permission of the Emperor of Austria, General von Lenk visited England for the purpose of thoroughly explaining his system; and we have in the report of the Committee the information, thus gained directly from the fountain-head, of the results of his experience in the course of trials extending over many years; together with additional investigations by individual members of the Committee.

"The advantages which are claimed for gun-cotton over gun-powder for ordnance purposes and mining operations are so many and so important as to call imperatively for the fullest investigation. Such an inquiry, however, in its complete sense, is both beyond and beside the scope and purposes of a purely scientific body; and the British Association have done well—whilst reappointing the Committee to complete certain experiments which they had devised, with the view of clearing up some scientific points which are more or less obscure—in pressing on the attention of her Majesty's Government the expediency of instituting under its own auspices a full and searching inquiry into the possible applications of gun-cotton in the public service.

"The absence of smoke, and the entire freedom from the fouling of the gun, are points of great moment in promoting the rapidity of fire and the accuracy of aim in guns employed in casemates or in the between-decks of ships-of-war; to these we must add the innocuous character of the products of combustion in comparison with those of gun-powder, and the far inferior heat imparted to the gun itself by repeated and rapid discharges. With equal projectile effects, the weight of the charge of gun-cotton is but one-third of that of gun-powder: the recoil is stated to be reduced in the proportion of 2 to 3, and the length of the gun itself to admit of a diminution of nearly one-third. These conclusions are based on the evidence of long and apparently very carefully conducted courses of experiment in the imperial factory in the neighborhood of Vienna. The results appear to be especially deserving the attention of those who are engaged in the important problems of facilitating the employment of guns of large caliber and of great projectile force in the broadsides of our line-of-battle ships, and in reducing, as far as may be possible, the dimensions of the ports.

"In the varied applications of explosive force in military or civil engineering, the details of many experiments which bear on this branch of the inquiry are stated in the report of the Committee, and appear to be highly worthy of consideration and of further experiment.

"It cannot be said that the advantages now claimed for gun-cotton are altogether a novel subject of discussion in this country. When the material was first introduced by Schönbein in 1846, its distinctive qualities in comparison with gunpowder were recognized, although at that period they were far less well ascertained by experiment than they are at present. To the employment of gun-cotton, as then known, there was, however, a fatal drawback in its liability to spontaneous combustion. The elaborate experiments of General von Lenk have shown that this liability was

due to imperfection in its preparation, and ceases altogether when suitable processes are adopted in its manufacture. Perfect gun-cotton is a definite chemical compound; and certain processes for the removal of all extraneous matter and of every trace of free acid are absolutely indispensable. But, when thus prepared, it appears to be no longer liable to spontaneous combustion; it can be transported from place to place with perfect security, or be stored for any length of time without danger of deterioration. It is not impaired by damp; and may be submerged without injury, its original qualities returning unchanged on being dried in the open air and in ordinary temperature.

"A scarcely less important point towards the utilization of gun-cotton, and the safety with which it may be employed in gunnery, is the power of modifying and regulating its explosive energy at pleasure, by means of variations in the mechanical structure of the cartridge, and in the relative size of the chamber in which it is fired.

"The experiments made by the Austrian Artillery Commission, as well as those for blasting and mining, were conducted on a very large scale; with small-arms the trials appear to have been comparatively few.

"There can be no hesitation in assenting to and accepting the concluding sentence of the Committee's report:—'The subject has neither chemically or mechanically received that thorough investigation that it deserves. There remain many exact measures still to be made, and many important data to be obtained. The phenomena attending the explosion of both gun-cotton and gun-powder have to be investigated, both as to the temperature generated in the act of explosion, and the nature of the compounds which result from them under circumstances strictly analagous to those which occur in artillery practice.'"

NEW BOOKS AND PUBLICATIONS.

THOMAS, ON RIFLED ORDNANCE—Illustrated. D. L. Van Nostrand, publisher, 192 Broadway, New York.

In the present dearth of really good and popular text-books on the science of gunnery in general, and rifled ordnance in particular, the volume before us is one which will be eagerly sought for by those who seek to be well informed upon the subjects mentioned. The author is Mr. Lynall Thomas, F. R. S. L., an English inventor of some note, who has not contented himself with merely theorizing on the subject, but has demonstrated his arguments by practical tests against other weapons. Apart from the merit of the work in this respect, the manner in which the author expresses himself is worthy of the highest praise. Even to the professional individual, the study of machinery, or of theories connected with it, requires the closest mental application to master their intricacies, but when the labor is added to by the obscure phraseology, ungrammatical phrases, and defective technology of the writer, the task becomes too wearisome to be prosecuted, and many an ingenious theory and practical plan is thrown aside solely because the author has presented it in so forbidding a manner. No such fatal defects mar this work, and so happy is the style throughout that even those who have litttle or no knowledge of rifled ordnance cannot fail to acquire much valuable information by a perusal of the work under discussion. A brief synopsis of the table of contents shows the following interesting articles:—"On Rifled Cannon," comprising 9 pages; "On the Turn of the Rifling," 14 pages; "Influence of the Caliber on the Turn," with illustrations, 37 pages; also the form of the grooves, flight of projectiles and a new theory on the action of fired gunpowder. We have derived much valuable information from a hasty perusal of the work and shall return to it with pleasure as an opportunity affords. The mechanical execution of the work is good, and it is one which might adorn any parlor table. Price $2.

DANA'S ELEMENTARY GEOLOGY. By James D. Dana, LL.D., Professor of Geology in Yale College. Published by Theodore Bliss & Co., Philadelphia.

This is the title of a new "Text Book of Geology," designed for schools and academies. It is illustrated with three hundred and seventy-five cuts, is of a convenient size, and is well printed on good paper. In this work geology is treated as a history of the geographical changes of the globe, or those of its continents and seas, through successive ages, and a history of the progress of life from the earliest species up to man. The illustrations given of the science of geology are mainly drawn from American rocks; and it is truly a geological history of the American continent. It is a clear and able production, such as we would have expected from its eminent author. It will supply a want long felt in our high schools and academies.

MANUAL OF ELEMENTARY PROBLEMS IN LINEAR PERSPECTIVE. By P. Edward Warren, C. E., Professor of Scientific Geometry, &c., at the Rensselaer Polytechnic Institute. Published by John Wiley, 535 Broadway, New York.

Drawing is a science and an art; therefore to acquire a correct knowledge of it, the principles upon which it is based must be thoroughly understood. In this little volume of Professor Warren's, the principles of the art are very clearly illustrated and explained. It is divided into two parts, consisting of "primitive methods" and "derivative methods." A practical knowledge of the art of drawing is indispensible to architects, engineers and mechanics; and it is useful to all who are engaged in any of the arts requiring graphical representation or design. The author of this volume is a most competent person for the production of such a useful work.

THE ATLANTIC MONTHLY. Ticknor & Fields, Boston, Mass.

The ever welcome *Atlantic* comes to us regularly with its honest brown face and table of contents full to overflowing of interesting essays, tales, poetry, &c. The poetry of the *Atlantic Monthly* is uniformly of a high character: but the essays, though doubtless clear, are sometimes a little drawn out and (must we say it?) rather heavy. An article on "Genius," the leading one in the number for February, though exceedingly readable, covers 19 mortal pages, which is space enough, one would think, to exhaust the subject in. A tribute to the poet Bryant is in excellent taste; and this, in connection with the "House and Home" papers of Mrs. Stowe, is alone sufficient to render the number an interesting one. In addition, Agassiz contributes an article on the "Glacial Period," and there are a number of other miscellaneous articles which will be found interesting to the general reader. The *Atlantic* is for sale by all periodical dealers.

APPLETON'S POSTAL GUIDE. D. Appleton & Co., 443 Broadway.

We have received a copy of "Appleton's Postal Guide" from the publishers, which is published quarterly, carefully corrected and revised. We have had occasion to consult previous issues of this work and have found it an invaluable assistant in correcting the omissions of careless correspondents who have omitted their place of residence or the State and County they reside in. The guide contains a complete list of all the post-offices in the country, and is an authorized medium of information between the Post-Office Department and the public. Price, $1 per annum.

"THE PHILADELPHIA PHOTOGRAPHER."—This is the title of a new publication of which the first number is now before us, and a splendid specimen of the typographical art it is. A most beautiful photograph of the painting, "The Loan of a Bite," also accompanies it. The Philadelphia *Photographer* is a monthly work, at $3 a year. Each number is to be adorned with a photographic picture, worth of itself the price of the monthly part. The contents are of an interesting nature, and to all photographers will be useful and valuable; for they are evidently the productions of clear-headed, practical men. Our new cotemporary promises to be a valuable acquisition to the cause of progressive science; and we hail its appearance with pleasure. We wish for it the highest success. Benerman & Wilson, publishers, Philadelphia; Anthony, New York.

LATHES that do not bore straight holes can easily be altered without reboring the boxes the spindle runs in. Take a piece of tin, or metal of any thickness, and place it between the V of the shears and that in the head-stock of the lathe; this will throw the spindle in line with the shears again, so that it will bore parallel. Of course, the lining must be placed on the opposite side of the head-stock that is "out" of line, so as to bring it back. This is a quick and certain method of making a lathe bore a straight hole.

PRODUCTION AND CONSUMPTION OF COFFEE.

The two principal sources from which Europe is supplied with coffee are Java and the Brazils. The total annual production of coffee in the world may be estimated in round numbers at six millions of cwts., of which Europe alone consumes four and a half millions, or three-quarters of the whole quantity produced. It appears that, comparatively speaking, the greatest consumption is in little Switzerland, where it amounts annually to 12 lbs. per head of the whole population; that Holland, with its two and a half millions of inhabitants, drinks as much coffee as the thirty-six millions in France; that Belgium and Holland consume nearly 10 lbs. per head; that the Zollverein and Germany consume 4 lbs. per head, and the other countries only about 1 lb. per head. In Great Britain the consumption of coffee in 1862 was 309,500 cwts., which is equal to 1 lb. and eighteen-hundredths of a pound per head, taking the population at 29,193,397—the result of the census of 1861. In most parts of Europe the consumption of coffee has been rapidly increasing during the last few years, whilst almost everywhere it is capable of still greater extension, especially in the colder and more northern climates. On the other hand, it is demonstrated by statistics that the great wine-producing countries of Europe—Spain, Portugal, Italy, and Greece—consume comparatively but little coffee; and no doubt that France might be classified among these latter, were it not that the coldness of the climate of one-third of that empire—say from the latitude of Paris to the British Channel—prevents the grapes from ripening in that zone, and therefore opens the door for a larger consumption of coffee.

In Java the production of this berry has been at a stand-still for several years, as the Dutch Government finds it more profitable to increase the cultivation of sugar. Central America has for some time past been torn by dissensions and civil war, so that the inhabitants have neither time nor confidence enough in the future to turn their attention to the extension of their coffee plantations, which, unlike sugar, rice, and cotton, require several years before they attain maturity and bear crops. The other countries producing coffee are mostly islands, and having but a certain limited area, there is not much room for planting more coffee-trees.

The Brazils alone seem capable of growing coffee to an unlimited amount from the vast extent of their thinly populated territory; but, from various causes, they remain stationary, and, from a defalcation of their crops during the last two years in succession, the exports from that empire have even been considerably less than in previous ones. This failure of the crops is partly owing to climatic influences of an unfavorable nature, and partly to a disease that attacks the coffee-trees in certain localities, much in the same way as the vines are affected by the ravages of the oidium. It must also not be overlooked that the price of labor has of late risen to an enormous and unprecedented hight in the Brazils, in consequence of a want of sufficient influx of population, owing to the suppression of the slave-trade as a legal branch of commerce, and the increased difficulty, risk, and expense of smuggling in fresh supplies from Africa; so that the present high prices of coffee bring to the planters a less advantageous return than did formerly lower prices combined with the payment of less wages for labor. Whilst it was previously the invariable custom to under-estimate the crops in order to keep up the prices of coffee in the European markets, the very reverse is at present the case, as is illustrated by the crop of 1862-1863, which now turns out to be considerably less than the original estimate. The reason for this alteration of tactics may be accounted for by the fact that among the Brazilian coffee-planters there are many possessed of but very limited capital, who endeavor to keep up their credit by exaggerating the produce of their crops, by which they are enabled to obtain larger advances from the merchants to carry on their operations. In former years of peace and commercial prosperity, the United States used to import from the Brazils alone no less than a million and a quarter of bags of coffee annually; whereas, since the commencement of their unhappy dissensions, their imports from the same quarter have been reduced to 350,000 bags. As soon as the war is brought to a close, as it must sooner or later, there can be no doubt but that the Americans will again

draw largely for their supplies of coffee on the resources of the Brazils; and as it is an article of necessity for them when in a normal state of peace and prosperity, it is easy to foresee that they will become, as formerly, extensive purchasers, and pay any price for what they require. But as there is for the present a limit to the supply, the natural result will be, in all probability, that the prices of coffee in the European markets will run up to a far higher figure than even the high quotations of the present day.—*London Grocer.*

THE UNITED STATES MINT AND COINAGE.

The "Annual Report of the United States Mint and its Branches," for the year ending June 1863, has just been published. From it we learn that the amount of bullion received during the year was gold, $23,149,495 41; silver, $1,674,605 90; total, $24,824,-101 31. Deducting the bars made at one branch of the Mint, and deposited at another for coinage, the amount is $23,701,837 31. The coinage for the same period has been gold coin, $20,695,852; fine gold bars, $1,949,877 90; silver coins, $390,204 42; cents coined, $478,450; number of pieces of all denominations of coin, $51,980,575; total coinage, $24,688,-477 12.

The amount of bullion received and coined at the Mint and its branches is shown to have been: At Philadelphia, gold deposits, $3,401,374 55; gold coined, $3,184,892; fine gold bars, $156,039 74; silver deposits and purchases, $386,189 73; silver coined, $358,217 80; silver bars, $6,897 83; cents coined, $478,450. The total deposits of gold and silver have been $3,787,564 28. Total coinage, $4,184,-497 37. Numbers of pieces, 49,108,402.

At the Branch Mint, San Francisco, the gold deposits were $17,936,014 26; gold coined, $17,510,-960; silver deposits and purchases, $962,879 95; silver coined, $815,875; silver bars, $224,763 68. Total coinage of gold and silver, $18,551,598 68; number of pieces, 2,872,173.

The Assay Office in New York received during the year $1,812,106 60 in gold bullion; and in silver, $325,536 22. Fine gold bars stamped at that office, 1,488; value, $1,793,838 16; silver bars, 1,916; value, $158,542 91; total value of gold and silver bullion $264,137 82.

The branch mint established at Denver, Colorado, Territory, was not opened until the close of last September. Its operations are, for the present, confined to melting, refining, assaying and stamping bullion, which is returned to the depositor bearing the Government stamp of weight and fineness. Idaho is now yielding large quantities of very fine gold; and the gold workings in Oregon and Washington Territory are on the increase. Arizona is yielding both gold and silver and the natural supplies are unlimited.

Up to the close of the present fiscal year there have been 164,011,000 nickle cents coined; and the profits arising from these have paid all the expenses of coinage and distribution. It is recommended (in the Report) that the use of such a valuable metal as nickel may be dispensed with, and its place supplied by tin and zinc. The Report states that all of the silver which has gone into the three, five, and perhaps ten cent pieces, might have been reserved for larger coin, and the circulating value of these pieces have not been lessened thereby. Aluminum can be advantageously substituted for silver in small change, and thereby supplant the present postal currency. The Report urges that the mottoes upon our coinage should be "expressive of a national reliance upon divine protection, and a distinct and unequivocal national recognition of the divine sovereignty."

COMPOSITION OF THE ATMOSPHERE—VALLEY OF DEATH.

The atmosphere that we breathe in its ordinary healthy condition is composed of the following constituents:—Oxygen, 20·61 per cent.; nitrogen, 77·95 per cent.; carbonic acid, ·04 per cent.; watery vapor, 1·40 per cent. Now, the oxygen is the important ingredient which supports life, the nitrogen being only a diluter of the oxygen; the carbonic acid gas is in scarcely appreciable quantity, and that is produced by the process of respiration and combustion on the surface of the earth, by which immense quantities are continually being formed; nevertheless, the proportionate quantity scarcely varies, for this very gas, which is exceedingly destructive to animal life, is, as all know, the principal food upon which the vegetable world lives, absorbing this carbonic acid from the air, and decomposing it, retaining its carbon and giving off the oxygen, which is just what animals require. The destructive agency of this gas—viz: carbonic acid—on animal life is well exemplified in certain places where large quantities are evolved from the earth, the most striking instance being the celebrated valley of Java, which, if any animal enters, he never leaves. The following is an interesting account of this valley, given by an eye-witness:—

We took with us two dogs and some fowls to try experiments in this poisonous hollow. On arriving at the foot of the mountain we dismounted and scrambled up the side, about a quarter of a mile, holding on by the branches of trees. When within a few yards of the valley we experienced a strong, nauseous, suffocating smell, but on coming close to its edge this disagreeable odor left us. The valley appeared to be about half a mile in circumference, oval, and the depth from thirty to thirty-five feet; the bottom quite flat; no vegetation; strewed with some very large (apparently) river stones, and the whole covered with skeletons of human beings, tigers, pigs, deer, peacocks, and all sorts of birds. We could not perceive any vapor or any opening in the ground, which last appeared to us to be of a hard sandy substance. It was now proposed by one of the party to enter the valley, but at the spot where we were this was difficult, at least for me, as one false step would have brought us to eternity, seeing no assistance could be given. We lighted our cigars, and, with the assistance of a bamboo, we went down within eighteen feet of the bottom. Here we did not experience any difficulty in breathing, but an offensive nauseous smell annoyed us. We now fastened a dog to the end of a bamboo eighteen feet long, and sent him in. We had our watches in our hands, and in fourteen seconds he fell on his back, did not move his limbs or look round, but continued to breathe eighteen minutes. We then sent in another, or rather he got loose, and walked into where the other dog was lying. He then stood quite still, and in ten minutes fell on his face, and never afterwards moved his limbs; he continued to breathe seven minutes. We now tried a fowl, which died in a minute and a half. We threw in another, which died before touching the ground. During these experiments we experienced a heavy shower of rain; but we were so interested by the awful sight before us that we did not care for getting wet. On the opposite side, near a large stone, was the skeleton of a human being, who must have perished on his back, with his right hand under his head. From being exposed to the weather, the bones were bleached as white as ivory. I was anxious to procure this skeleton, but an attempt to get it would have been madness.

BOILING FOOD FOR HOGS.

At a recent meeting of the Farmers' Club, Prof. Mapes made the following remarks in regard to boiling food for hogs:—"The proof of the saving of food by boiling has been given here, and, as it can be stated in very few words, we may as well have it. Mr. Mason was a watchmaker in Camden, N. J., and among other fancies he liked to keep hogs. He has his hog pen just back of his shop, so that he could sit at his window and watch his hogs. Every spring he bought some pigs and fed them through the season. Just opposite to Mr. Mason was the store of Mr. Van Arsdale, and every pound of food that Mr. Mason gave to his pigs he bought at this store. At the end of six months he got his bill from Mr. Van Arsdale, and he always slaughtered his hogs at that time, so that he knew exactly how much his pork cost. For several years it figured up about 13 cents per pound. At length some one advised him to boil his corn. He accordingly got a large kettle and cooked all the food which he fed to his pigs. Then his pork cost him 4¼ cents per pound! We also had the experience of Mr. Campbell, which was about the same as Mr. Mason's. Henry Elsworth made some extensive experiments in the same thing, and his statement is that 30 pounds of raw corn make as much pork as 13 pounds of boiled corn."

FOOD FOR CATTLE.

The high price of fresh butcher meat in our cities, should induce many farmers living near such large markets to devote more attention to the raising of sheep and cattle. It is not the province of every farm to produce this fatted meat. Some farms are, to all intents and purposes, breeding farms; others are fatting farms; but both are engaged in their respective ways to provide for the public wants—the public larder. To keep up a successional supply of nutritious food on every farm is no easy task. Throughout the summer, autumn, and winter, the difficulty is not great. The grass pastures and grazing seeds make ample provision for the stock during the summer and autumn, and the root crops for the winter. It is only in the early spring months and autumn that any difficulty arises, *i. e.* the interim between roots and grass and grass and roots. Now to provide against this uncertainty there are several common matters of business to be adopted and attended to. The culture of cabbage, carrots and turnips should be adopted for feed, and given as such till near midsummer. In average seasons a supply of cabbage of one variety or other may, with care and judgment, be maintained throughout the whole year. The large Drumhead cabbage and early varieties would form the great feature in cabbage culture, and if the cabbage was carefully cut and carried to the animals, the stalks on putting out new shoots would yield a fresh supply in early spring.

FOREIGN SCIENTIFIC MISCELLANY.

It is easy enough to condense steam, and to burn the visible particles of carbon which we term smoke—the latter operation can indeed always be carried out by a skillful fireman; but the gaseous products of combustion have never been completely consumed in any instance that we know of. It is therefore thought that, in the underground railroad in London, air may yet be used for propelling the trains, similar to that used by the Pneumatic Dispatch Company. The use of air for such purposes is a subject worthy of patient investigation.

There is a project on foot to establish a street railway in Dublin. The line is designed to be carried on an ornamental viaduct, the arches of which are to be made available as warehouses. In a wide street like Sackville street, Dublin, such a plan is practicable; but in Broadway it could not be carried out without doing immense damage to property. This scheme exploded here some years ago.

In the year 1863 there were 1404 fires in the city of London, only 39 of which resulted in the total destruction of the buildings. For the whole number of fires there are 112 alleged different causes: 227 originated from candles, 117 from flues, 26 from matches, 107 from sparks, 100 from gas, 24 from hot ashes, 31 from smoking tobacco, 41 from airing linen, 39 from children playing with fire and matches. During the same year there were 361 fires in New York and 300 in Paris.

The great Mont Cenis tunnel through the Alpine Pass is making slow but steady progress. Boring machines were set to work in 1861. During the past year cutting was done at the rate of 4 feet 5 inches per day, so that at the present rate of working it will require nearly 15 years to complete the job! The rock in which the excavation is at present being made is exceedingly difficult to work, having what the engineers have termed an "infelicitous stratification."

The *Great Eastern* is advertised for sale by order of the mortgagees. She is 680 feet long, 82 feet in breadth, and 57 feet deep. She can accommodate 1,586 passengers, and stows 10,000 tuns of coal. Her engines have an effective horse-power of 8,000 horses. She has also fresh-water condensers capable of supplying 4,000 gallons per day. She is a splendid specimen of naval architecture, though an unfortunate speculation to her projectors. This vessel was recently put up at auction in England, but only £50,000 being offered, she was bid in by her present owners.

When all the bridges across the Thames at London are complete they will form a sight unrivalled in the world for magnificence. Two splendid new bridges are now in course of construction, one of which is designed to accommodate four lines of rails, with side ways for passenger traffic. Within the limits of London we believe there are now seven fine bridges and one tunnel. The shipping of the Thames is all "below" the old London Bridge.

The incline of the Bohore Ghaut range, recently completed, is one of the most remarkable achievements of railway engineering in East India. The incline is nearly 16 miles long, with a total rise of 1831 feet, the two steepest gradients being 1 in 37 feet, and 1 in 40. It includes 25 tunnels and 8 viaducts, with 1,250,000 cubic yards of embankment, and has occupied seven years in construction.

Glass bushes or steps are being used for bearings for shafts, to some extent, in England; the glass being protected at the ends by metal flanges attached to the pedestals with papier maché or india-rubber interposed.

Nuts that do not set squarely on their bottoms soon strip the threads off the bolts.

Improved Corn or Seed Planter.

The labor and time occupied in seeding ground is well known by practical persons to be very great; and since the introduction of machinery to perform this duty it has been much facilitated. The engravings published herewith represent a new corn-planter, for which a patent is now pending through the Scientific American Patent Agency.

The plan of the machine consists in providing a rectangular frame, A, with a second one, B, mounted on wheels and secured by hinged joints to the first one mentioned. In A the seed boxes, C, are placed, as also the automatic arrangement for opening and closing the apertures in the bottom of the seed hoppers, through which the grain falls into the track made by the drills, D. The seed-distributing machinery consists of an iron shaft, E, working in bearings, and having two vertical arms which are connected to a vibrating slide (see Fig. 2), F, in the bottom of the seed box. The shaft has also a horizontal arm, G, which is driven by two or more pins, H, placed at equal distances in the rim of the wheel. It will be seen that by this arrangement the pin strikes against the arm and depresses it, and in so doing moves the slide, F, to one side, so that the corn or other grain falls out. After the pin passes over the lever the same is restored to its position by a small spring, I, on the under side. When the driver has traversed the whole field and wishes to retrace his ground in order to plant a second row in line with the first, the machine is turned about and brought into the proper place; at this time the lever behind the driver's seat is brought into requisition. In order to make the planting begin at the proper time the pins must strike the lever at a certain point; to do this the driver raises the lever, J, which throws the T-headed bar, K, down on the ground and raises the wheels clear; they are then to be turned by hand until the pins are in the proper position to commence work. By the arrangement of these several parts a convenient and simple machine for planting grain of any kind, and at all distances apart, is secured.

Fig. 2

For further information address the inventor, James McKell, at Burlington, Iowa.

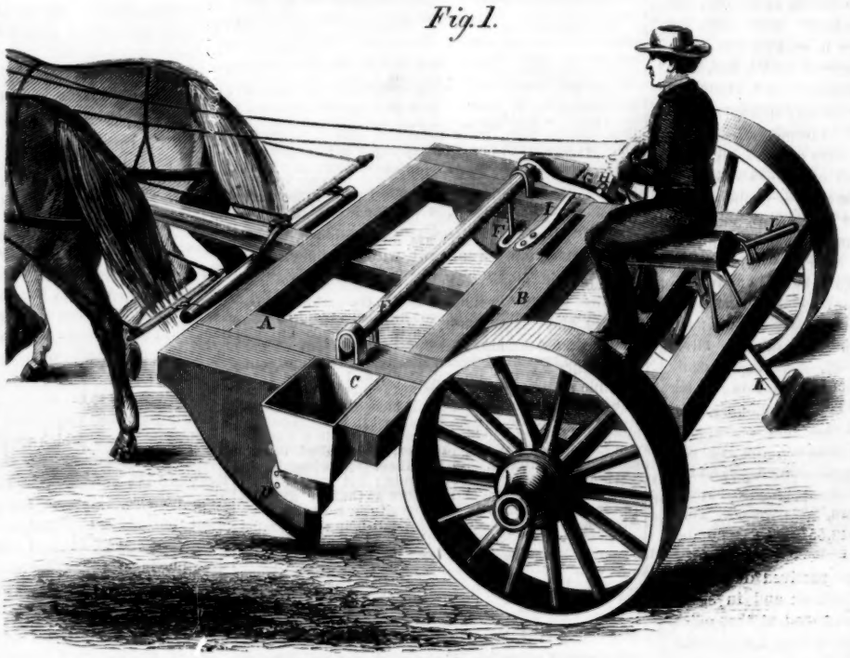
We learn from a foreign contemporary that the 9-inch cast-steel gun of Krupp has pierced two 4½-inch iron plates bolted together. One of the guns burst at the 69th round. The weight of the projectile, as also the range and charge of powder, is not stated.

AMERICAN CAST-IRON ORDNANCE.

The appended letter (cut from the Philadelphia *North American*) contains some interesting information concerning the progress our founders are making in the matter of combining iron ores, so as to produce the greatest possible tensile strength. The name of a Reading firm appears rather too prominently, but for the sake of the information we are glad to reprint the article:—

"The manufacture of heavy ordnance for the army and navy of the United States, recently commenced on a somewhat extensive scale in this city, has been attended with such favorable and extraordinary results, and is so likely to be associated hereafter with the most important manufacturing interests of the commonwealth, that I am induced to forward you for publication some of the main facts and features of the enterprise. For these facts I am indebted to a very intelligent gentleman who has for some time been connected officially with the deputation sent here by the Army Bureau to conduct the experimental tests of the strength of the ordnance produced, and I deem them of such importance as that a record should be made of them for the information not only of our own people, but for whatever satisfaction may be deduced therefrom by those of foreign nations, whether friend or foe.

Fig. 1.



M'KELL'S CORN OR SEED PLANTER.

The first trial of the iron of this county for ordnance was made in 1861, under an informal contract between the Chief of the Naval Ordnance Bureau and the firm of Seyfert, McManus & Co. As they had not, at that time, completed their arrangements for the regular manufacture of cannons, they sent the metallic material to Philadelphia, where a 9-inch gun was cast and sent to Washington, to undergo the usual proof-tests to which all classes of ordnance are subjected. This gun was tried 600 rounds with a service charge of 10 pounds of powder, and with shells weighing 69 pounds. The charge was then increased to 12½ pounds of powder, and a corresponding increase of the weight of solid shot, with 500 additional rounds. This series of discharges was made with great rapidity, with a view of imposing an additional test of capacity—reaching as high as 196 rounds per day. The experiment was so entirely successful and satisfactory that Admiral Dahlgren, in his report, mentions the gun as one of extraordinary excellence.

"In the meantime, Messrs. Seyfert, McManus & Co., were erecting the necessary machinery for the regular manufacture of similar guns at their own foundry; and contracts for fifty 9-inch and fifty 11-inch guns were subsequently obtained, and the cannon manufacture was thus, for the first time, regularly commenced in this city.

"As guns of all classes and caliber are required to be tested, it is the practice to select one which combines certain fixed data of density, tensile strength, &c., and subject it to what is termed extreme proof. It is assumed that all other guns made of the same iron, and under circumstances precisely similar, will exhibit the same peculiar strength and qualities; and this rule holds good so far in experience that deviations from it are extremely rare and exceptional. In accordance with this rule an 11-inch gun was selected, and under the supervision of the authorized agents of the Navy Department, was subject to the same ordeal, with the following extraordinary results. One thousand (1,000) rounds were fired, with service charges of 15 pounds of powder and shell weighing 132 pounds. Subsequently the charges were increased to 25 pounds, and solid shot weighing 164 pounds, and the gun withstood the enormous pressure of 127 rounds, when it burst. This was a test which would never have been required or attempted in actual service, and probably has but few, if any, parallels in the history of cannon.

The famous attack of the rebel iron-clad *Merrimac*, and the destruction of our wooden naval vessels, and her subsequent defeat by the first monitor, initiated an entire revolution in naval combats. Iron-clad vessels, propelled by steam, and carrying two or three guns, of very heavy caliber, have since taken the place of our wooden (armed) sailing vessels, with their broadside bottoms. To meet the exigencies of this radical change in the armament of our navy, the Bureau of Ordnance gave orders for three thirteen-inch guns to be made; one at Providence, R. I., one at Pittsburgh, and one at Reading. These guns were of the same size, weight and dimensions, made in accordance to diagrams and instructions from the Naval Bureau, excepting that of Providence, which was cast solid, while the other two were cast upon the plan of Major Rodman, U. S. A.—that is hollow, or on a core, as it is termed. When finished, however, the guns were required to conform to the size and dimensions specified in the diagrams of the Bureau, so that in that respect no difference existed between them. The length of the guns, as finished, was from cascabel to muzzle, 13 feet 6 inches; diameter at breech, 3 feet 9 inches; at muzzle, 2 feet 4 inches; caliber, 13 inches; length of box, 10 feet 10 inches; estimated weight, 37,000 pounds.

"Now, let us witness their qualities. The Providence gun was tested in that city by an experienced ordnance officer. Commencing with a charge of thirty pounds of powder and 280 pounds of solid shot, ten rounds were fired. With forty pounds of powder and same shot, ten rounds more; with fifty pounds of powder, and shot same as before, 158 rounds more—finally bursting on the one hundred and seventy-eighth round. (Illustrated on page 324, Vol. IX. of the Scientific American.) The greatest enlargement after the first ten rounds was the 89-1000ths of an inch; after ten rounds, 127-1000ths of an inch; after the one hundred and seventieth round, 150-1000ths of an inch.

"The Pittsburg gun was sent to Washington, and no authentic details of its proof have been received; but it is sufficient to state that, while undergoing trial, the bore became so terribly scored by the abrasion of the balls that it was considered unsafe to prosecute the experiments within the limits of the navy-yard, and it was consequently removed to some point down the river, where it burst into fragments at the one hundred and fiftieth round, or thereabouts.

"The Reading gun was proved near this city, un-

der direction of the Navy Department. It has fired five hundred rounds with fifty-pound charges of powder, and with solid shot weighing 280 pounds. Its greatest enlargement during this enormous test was 87-1000ths of an inch; and there is not a visible defect to warrant a doubt of its capacity for another five hundred rounds. It is safe to declare that no gun in this or any other country has ever been subjected to and withstood a severer test.

"The guns made here are fabricated from an iron composed of hematite and magnetic ores, obtained in the vicinity of Reading. The magnetic oxides occur in the range of mountains known in Virginia as the Blue Ridge, and on the Susquehanna as the Conewago hills. The iron is associated with silex and feldspar, and generally occurs in rocky veins. When it is free from sulphur, and mixed with suitable proportions of hematite, it produces iron of the highest quality, and adapted for almost any desired purpose. The magnetic variety is what is termed a neutral ore, and makes iron of extraordinary strength and hardness, which may be modified at pleasure by the introduction of hematites. The success achieved in the manufacture of ordnance has created an unusual demand for that particular variety of metal, and it is eagerly sought for, not only by the gun foundries of Pittsbugh, Trenton and the East, but also by the manufacturers of wire, screws, cutlery, and every variety of iron requiring peculiar strength and hardness. Indeed, large quantities of the raw ore have already been sent to remote points—in some instances they have been hauled a distance of fourteen miles by wagons, and then shipped by railway a distance of 360 miles to be smelted. These facts indicate not only the local value of the iron mines tributary to Philadelphia, but would seem to justify the expenditure of large capital to manipulate them into the different manufactories now successfully carried on in distant regions under the stimulus of a more enterprising spirit.

"I may add, in conclusion, that the credit of making the strongest gun ever cast in the world belongs mainly to James McCarty, of the firm of Seyfert, McManus & Co. It was through his experiments in securing a proper combination and treatment of ores that the highest strength was secured to the metal; and although the task would now appear to be simple enough, yet at the outset it involved a vast amount of patient labor and research, the benefit of which will ultimately accrue no less to his fellow-countrymen than to himself. ELI BOWEN."

DEFECTS OF THE BRITISH IRON-CLADS.

We republish the following sensible remarks from an editorial in *Mitchell's London Steam Shipping Gazette*:—

"For sea-going ships the deck battery is a defect, for, no doubt, such vessels would roll badly. The weights could not be properly distributed. They would lie much better with the addition of guns between decks. No better specimens of war ships have ever been constructed than the two rams built by Messrs. Laird at Birkenhead. These vessels are armor-plated from bow to stern, and have projecting beaks. If one of them were to steam bow on to the *Warrior* or *Black Prince*, she would probably crack the unprotected hull of these big ships under water like egg-shells.

"We believe there is not a perfect iron-clad yet commissioned in the Royal Navy. All the partially-armor-plated vessels must roll in a seaway, and then they expose common iron-built hulls below the load-line, with screw propellers inviting well-aimed shots. No nation has succeeded in solving the problem of turning out vessels quite impenetrable and yet lively at sea. Our *Warrior* class are certainly magnificent ships, but they are expensive ones. They all leak badly, and require constant docking. The *Minotaur* and *Northumberland* carry their armor plating from bow to stern, but they are propelled by one screw, and are not adapted to attacks in shoal water, from their great draught. Mr. Reed, the Constructor of the Navy, has designed a new class of ship which, we suspect, will be found suitable for sea-service; and, as he is not wedded to ancient ideas, he may yet improve our fleets by attending to the suggestions and advice submitted to his department, and keeping pace with the advanced notions of those who give their attention to naval architecture."

Correspondence

Laplace's Correction for the Velocity of Sound.

MESSRS. EDITORS:—I wish to place on record in the SCIENTIFIC AMERICAN, a single numerical result of experiments made on a cubic foot of air, and repeated a score of times, from 1852, up to present date, 1864, for the purpose of verification. I wish to place it on record, because I know the attention of several European physicists is directed to this point at the present time.

Experiment.—A cubic foot of air was heated from 32° to 522° under constant pressure, thereby doubling its volume by expansion, and raising 144×15=2,160 lbs. 1 foot high. The same cubic foot of air was afterward heated from 32° to 522° under double pressure, and with a constant volume.

Now, in these two experiments, the quantity of matter heated is the same—one cubic foot of air; the range of temperature is the same—490°; but the quantity of heat imparted is not the same in both cases. The quantity applied, when the pressure is constant and the volume variable, is to the quantity applied when the pressure is variable and the volume constant, as—1·41724 : 1·00000.

In other words, 0·41724 additional grains of combustible matter were consumed in producing heat that lifted 2,160 lbs. 1 foot high. I wish to place this result on record, for the ratio of the two specific heats used by Laplace in his correction of Newton's formula for the velocity of sound, and also used by Meyer, Dr. Tyndall and other eminent physicists, for computing the mechanical equivalent of heat, is 1·421.

When Newton calculated the theoretical velocity of sound in air by means of the formula

$$v = \sqrt{\frac{e}{d}}$$

in which v represents velocity, e elasticity and d density, both at zero; he found that it differed from the observed velocity by about one-sixth of the whole amount. In this calculation, Newton only considers the changes of elasticity due to changes of density; but Laplace accounted for this deficiency by assuming that the effective elasticity is augmented by changes of temperature produced by pressure in the condensations and rarefactions of sonorous waves. So that, according to Laplace, the effective elasticity must be multiplied by the square root of the quotient obtained by dividing the specific heat of air at constant pressure by its specific heat at constant volume.

But since the ratio was then not known by actual experiment, Laplace reversed the process of his calculation, and deduced from the velocity of sound, which had been well determined, the ratio of the two specific heats, which he found to be 1·421. The excess of 0·421 is now used to express the amount of heat consumed in external work, when the air is allowed to expand under constant pressure. And from this number also is deduced the mechanical equivalent of heat. But my own direct experiments with a cubic foot of air (made with great care, under favorable circumstances and with the best instruments) prove that this excess is too much; the correct value is between 0·417 and 0·4173, and the average is 0·41724.

Laplace's correction is purely inferential, and its correctness depends on the assumed value of the velocity of sound *with no allowance for radiation*. Although air is practically a vacuum, as regards the radiation of heat, and has no sensible power to neutralize, by radiation, the differences of temperature in the condensed and rarefied portions of a sonorous wave; yet the vapors mixed with the atmospheric elements—in the lower strata of the atmosphere especially, where the velocity of sound has been tested experimentally—are competent to neutralize this difference, because they have been proved to possess a sensible power of absorption and radiation. They will, therefore, so far diminish that portion of the elastic force on which Laplace's correction depends, that a less ratio for the two specific heats must be deduced from the velocity of sound, and more in accordance with the ratio I have deduced from direct experiment—it must be nearer 1·41724 than 1·421.

Dr. Tyndall's recent experiments on the radiation of vapors in the atmosphere, cited in his recently-published work on "Heat as a Mode of Motion," and his anticipations in the form of a "note" in the *Philosophical Magazine*, coupled with the published views of other eminent physicists, all lead to the expectation of a correction in Laplace's formula, and a slight diminution in the excess (0·421) which his formula gives, which deduction is due to radiation from every condensed portion of a sonorous wave. Direct experiment with atmospheric air is the only satisfactory mode of settling this question; and my experiments, made for this very purpose, and often-times repeated, prove that the ratio of the two specific heats for condensed and rarified air is as 1·00000 to 1·41724.

S. BESWICK.

Brooklyn, N. Y., January 30, 1864.

Ventilation of Public Buildings.

MESSRS. EDITORS:—I presume that there are very few who have not suffered from the inconvenience of ill-warmed and poorly ventilated public buildings, but more especially churches. When these last are of modern construction and high in pitch, open timbered and with lead sashes, it is a difficulty to treat them; and this difficulty, particularly in country places, is rarely overcome. I have recently furnished the plans for a building of this kind, and the method of warming and ventilating that I have adopted has proved so efficacious and is withal, I believe, so novel, that I am led to offer in your columns a description of it for the benefit of others.

The building that I had designed and purposed warming was a church of the usual cruciform style, having a nave and transept. The whole length of the nave in the clear is 82 feet, while the arms or transepts are 12×30 feet; the hight of roof to ridge, 32 feet; the side walls, 12 feet. My plan was to do away with the great absorption of heat in the mass of masonry usually surrounding a furnace, and to take the whole space under the church for a hot-air chamber. The foundation was well laid and the wall closely built, making all tight up to the sills. I caused the ground to be excavated under the cross section to the depth of 8 feet, and about the same size as the transept; thus making under that part of the building a room of 11×24 feet. From this the ground was excavated on an inclined plane up to the extreme end of the church, where the distance from the floor to the ground was about 18 inches. The entrance to this room was from the end of the building near the transept, in which, as usual, was a door under the floor. Into this space below, two chimneys (carried up through the wall) entered and carried up the smoke of two large-sized "box stoves." These stoves had pipes of some twelve feet in length, to secure the transmission of all the heat ere entering the chimney. Directly over the stoves two openings in the floor formed registers, 4×3 feet, capable of being opened or closed at pleasure. Then in all the seats, at such distance as the feet of persons sitting or standing would come, there were bored in the floor with an inch auger, five holes, in diamond form, making a kind of small register to each person.

The system of heating is this:—The inclined plane of the ground under the floor, through the whole length of the building, acts as a *descending* grade for the cold air dropping through all these numerous apertures in the floor. The cold air flows down and is drawn toward the stove in the chamber, either for combustion or heating. The hottest air meantime, passing directly up through the large opening over the stove, ascends into the building and aids in pressing down the colder air falling through the other apertures. The result is that the building is heated with great rapidity; two or three hours sufficing for doing what an ordinary furnace would, by mere radiation or compression, require six or seven hours to accomplish.

When the time for divine service has arrived and the congregation have assembled, the registers over the stove are to be closed and the process thus far going on is in a degree reversed: the warm air then flows *up* the inclined plane pressing against the floor and rising through the numerous openings, to the feet and clothes of the individual seated or standing above, effectually warming them. By this contrivance the air above, instead of being much (as usual with one column of furnace heat) hotter than that around

the feet, really becomes—during the service—cooler; while the warmest air continues to ascend, entangled with the persons and clothes of the audience. It is a known fact that if the feet and lower limbs of persons are kept perfectly warm, a far lower temperature suffices for the body. In most buildings precisely the opposite course takes place, the air above and around the head and near the ceiling being heated to an intense degree, the feet and floor remaining cold. The plan I have adopted prevents this, as the floor itself is entirely warm, and the currents of warm air ascending keep the whole assembly in comfort. The cheapness of the method also recommends it, as there is no cost for anything but the box stoves and excavation. The earth itself, being a poor conductor of heat, is left without paving.

Of course, in very large buildings my plan would not be practicable, but in most of those designed for 400 or 500 persons it is so; and my experience with the building I have mentioned shows that most country churches may be warmed thoroughly without the unsightly-looking stoves and pipes, or the expensive furnaces.

R. Whittingham.

Small Traction Engines.

Messrs. Editors :—On page 9, Vol. IX (new series) of the Scientific American, in an editorial article headed "Agricultural Machines," you stated as follows :—"In conversation, a few days since, with a most intelligent Western farmer, he told us that manual labor was so scarce in the country last autumn, that but for horse-rakes, mowers and reaping machines, one-half of the crops would have been left standing on the fields." That Western farmer told you the truth; at present, the demand for manual labor is daily increasing, as is also the want of agricultural machinery.

In another editorial article headed "Steam for Agricultural purposes" (immediately following the one above alluded), you wrote thus :—"The application of steam to the business of farming has not been as general in this country as we could wish. Neither, from present appearances, are we very sanguine that it will become popular. We are at a loss to account for this very general indifference of our farmers on what would seem a matter of vital importance." Permit me to state that the farmers are *not* so indifferent as you suppose them to be; but, not being able to obtain machines adapted to their wants, they use such as they can get.

One of the greatest wants in the grain-producing portions of the North-western States is a portable traction engine, of about eight-horse power. The thousands of threshing machines which thresh millions of bushels of grain annually, are mostly each driven by the power of eight horses; this being the hardest work to which horses can be subjected upon the farm; and this occurs at a season when the horses are required for other work necessary to be done before frost sets in. Many portable steam engines are made expressly for threshing and work well; but they do not come into general use because they require from four to six horses to move them and the threshing machine from place to place; and in cases where horses have to be kept for that purpose they might as well do the threshing. Thousands of engines are wanted, that will move themselves and the threshing machine and drive the same when in operation. If there is genius enough (and who can doubt it?) in the inventive brotherhood, throughout the United States, to produce whatever is urgently *wanted*, let some one invent such an engine without delay. Thousands of farmers are ready to buy them at once.

D. McDonald.

Verona, Wis., Feb. 1, 1864.

Precaution against Fire.

Messrs. Editors :—The awful and harrowing circumstances of the late catastrophe in the cathedral church of Santiago, in South America, whereby more than two thousand human beings (chiefly women) were burnt to death, should be a warning to school trustees and others having control of large places of assemblage. Notwithstanding the fearful lessons that have occurred in the past and are likely to be too often repeated, the builders of such structures, even in this enlightened land, continue to make "traps" for men, women and children, by the altogether inadequate means provided for sudden egress. The stairways are often narrow and devious, and their still narrower doors, in the vast majority of instances, open *inwardly*. Even conceding that, for ordinary use, it is best that doors should thus open, why, in the name of mercy, not make such doors a part of still larger ones, which, on the withdrawal of a single bolt, or even with a certain amount of pressure from within, shall widely open their portals in an outward direction? But, after all, it is questionable whether the sudden calamity of the Santiago worshipers is really more deplorable than the slower but more widespread waste of nerve and muscle incident to the "high pressure" system of teaching and the exclusive use of air-tight stoves in American school-rooms. When will the community learn that to sacrifice the brains and constitutions of their offspring to a supposed saving of fuel has not even the poor plea of economy, for what production is so costly as a *child*?

G. H. Knight.

Cincinnati, Ohio, Jan. 30, 1864.

Nitrous Oxide Gas.

Messrs. Editors :—The fears I expressed in my first letter to the Scientific American, relative to the laughing gas, have unhappily been realized. One person has fallen a victim to its use. The following is an extract from the New York *Herald* of Wednesday, January 13th:—"Samuel P. Sears, 23 Park Row, died yesterday at the dental establishment of James Burnett, 373 Canal street, from the effects of 'Laughing gas,' which had been administered for the purpose of extracting a tooth. Deceased had been ill for a long time with bronchitis and hemorrhage of the lungs. He died two hours after the inhalation of the gas. Dr. George B. Banton, who made the post mortem examination, gives his opinion that death was caused by congestion of the lungs, accelerated by the inhalation of the gas."

I have no reflection to make on the above statement. It is true that the victim was in the last stage of consumption; but if the gas has proved fatal to him, how will it act on persons in the first stage who are affected with lung disease?

H. Dussauce.

New Lebanon, N. Y., Jan. 25, 1864.

Strength of Steam Boilers.

Messrs. Editors:—As my letter to you of the 15th inst. (published on page 71, present volume of the Scientific American) only gave a rule by which to calculate the strength of boilers that are single-riveted, and as it is as necessary to know the strength of double-riveted ones, I herewith forward you a table containing both:—

Plates.	Single-riveted.	Double-riveted.
1-8th-inch	2,500 lbs.	3,125 lbs.
3-16th-inch	3,750	4,687
1-4th-inch	5,000	6,250
5-16th-inch	6,250	7,812
3-8th-inch	7,500	9,375
7-16th.inch	8,750	10,937
1-half-inch	10,000	12,500
9-16th-inch	11,250	14,062
5-8th-inch	12,500	15,625
3-4th-inch	15,000	18,750

The strength of single-riveting is 56 per cent. and of double-riveting 70 per cent. of the whole strength of the plate. The tensile strength of the iron should be 60,000 lbs. per square inch, any variation from that strength will, of course, proportionately increase or decrease the rates given below. I may here again remark that by dividing the number of pounds given in the table, opposite the thickness of plate used, by the diameter of the boiler in inches, the result will be one-third of the bursting pressure of any new boiler.

Wm. Toshach.

Schenectady, N. Y., Jan. 28, 1864.

The Relative Motions of the Crank Pin and Cross-head.

Messrs. Editors :—It has been a query with me whether or not the cross-head of a steam engine, with perfectly tight boxes, stops at the end of the stroke. Does not the fact that a perfect circle (such as the wrist-pin describes) has no part of a straight line, go to prove that the cross-head does not stop; but, upon completing the stroke in one direction, immediately —without a pause—commences the return movement?

A Mechan c.

[The fact of the crank pin describing a circle has not the slightest connection with the subject. By the mechanical arrangement of the parts mentioned the crank pin passes over a longer distance than the cross-head when on the center, and though the stoppage of the cross-head is inappreciable, a cessation of its motions does take place if the engine is at work; but for this the engine would not work. No matter in motion can receive impulse in an opposite direction, unless the first movement be absorbed or lost, and a new impetus given.—Eds.

Iron Frames and Timber Planking.

The *Commercial Bulletin*, in directing the attention of the Boston merchants to the best modes of shipbuilding (they having organized a company to establish a new ocean line of steamers between their city and England), thus describes the great strength of the Cunard steamers:—

Many of the vessels which compose it are built of wood, but so expensively, that we fear our economical commercial men would not be likely to copy their details. Not only are their frames of the best English and African oak, equal to our live oak, but they are planked and ceiled with the same material—are cross-braced with iron and double planked. The first planking is six inches thick, of oak; and the second, which extends several feet above the line of flotation, is of American elm, three inches thick. The value of such extraordinary strength, has been tested upon many occasions; but strikingly so, when the *Africa* ran foul of the rocks off Cape Race. She only damaged her fore-foot, and a part of her keel; but if she had been of iron, it is possible that she might have been lost. But recently the Cunard Company have built their most magnificent vessels of iron. The *Persia* and *Scotia*, as well as all their numerous trading steamers, are of iron. It is doubtful whether they will build any more wooden vessels. But iron is now in general use throughout Great Britain for merchant vessels of all classes.

With regard to vessels built with iron frames and wooden planking, which have been described and recommended in the Scientific American, the *Bulletin* says:—

Capt. R. B. Forbes, in the construction of the *Niphon*, now a gunboat in the United States service, introduced a new principle. She is a combination of wood and iron. Her entire frame, keelsons, hooks, knees and beams are iron, but she is planked with oak and coppered. The object of this is to avoid that great drawback to the efficiency of iron vessels, namely, fouling under water. She has all the internal capacity of iron, the strength and cleanness of wood coppered, and she cost about a medium price between the two. We present these three modes of ship-building for the consideration of those who are now laboring to develop our steam commerce.

Treatment of the Sting of Bees.

The organ with which bees inflict their sting consists of two barbed or rather serrated darts issuing from a sheath and placed back to back, so as to leave a groove between them. The sheath is encased in nine cartilaginous scales provided with muscles, eight of which perform the duty of pushing the weapon out, while the ninth draws it back. To increase the pain caused by the mechanical action of the dart, a poison is secreted from two bladders situated on both sides of the intestines, and it is this poison which causes the formation of a small pimple of an erysipelatous redness. This generally disappears in a few instants, but, sometimes, when several stings have been inflicted at a time, or when even a single one has injured a nervous filament, the inflammation is rather severe. In such cases, Dr. Latour proposes the following treatment:—1. To pull out the sting which generally remains in the wound. 2. To foment the place with iced water, or else extract of saturn or ammonia. 3. To apply an impenetrable coating of collodion, rendered elastic by the addition of one-tenth part of castor oil, whereby the production of heat in the living tissue is prevented and inflammation avoided.

New System of Cure.

A Turkish newspaper publishes the following advertisement:—

Headache, Toothache, Lumbago, Eye-sores, Fever, &c., cured by a celebrated divine (?) just arrived from Asia Minor, by breathing on the patient and by charms. Address *Dede-Kave*, at Alseral.

If this "divine" Turk should set up an office in New York, and advertise in the papers that he could cure diseases by the power of his breath, or by the use of charms, he would have a thousand patients daily besieging his doors. If he can really cure "eye-sores" we recommend Inspector Boole to import the "divine" at once, and get him to breathe upon our filthy streets. Such an "eye-sore" is painful enough at present to warrant almost any amount of quackery.

No drill will cut well or make a fair round hole when one lip is longer than the other, or when it is too broad and thick on the point.

Submarine Firing.

As this subject is one that now attracts attention, we publish the following extracts from a record of Robert Fulton's experiments:—

"With this view he instituted a number of experiments to try the practicability and effect of discharging cannon loaded with ball at different depths under water. He made a number of calculations on this subject. His desire was to ascertain what resistance a ball, of given dimensions, propelled with a certain velocity, would meet with in passing through a body of water at a certain depth. The basis he took for these calculations and the calculations themselves mark both his ingenuity and science. He assumed that a body passing through water would meet with a resistance equal to the force of a column of water of the same diameter as the body moving with the given velocity. He then ascertained what head or weight of water would be required to discharge a stream of water from an orifice at the foot of a perpendicular tube with the same velocity with which the body was supposed to be propelled. He then, by the well-known rule of hydraulics, found what force or power the ascertained head of water would give, and thence formed his estimates as to the resistance which a body projected in water would meet with.

"In this instance, as in others, he was not satisfied with arriving at the information necessary for his particular purpose; but he established from his calculations a rule which may, by a very brief and simple arithmetical process, afford all the information and accuracy generally necessary for practical purposes. His first experiment was with a four-pounder, having the breach, and as much of the gun as is usually within the sides of a vessel, in a water-tight box, and the muzzle stopped with a tompion. The box and gun were then submerged three feet in the Hudson. The gun was fired by dropping a live coal through a tin tube which penetrated the box immediately above the vent of the gun, and rose above the surface of the water. The ball was found to have struck the sand at the bottom of the river, at the distance of forty-one feet from the muzzle. The gun was uninjured.

"This experiment satisfied him that guns might be placed in a ship, below her water-line, with their breech on board and their muzzles in the water, without any more danger of their bursting than there is when they are fired in the air. This gave him the idea of arming ships with guns to be fired in this way. He proposed that the muzzle of the gun made for the purpose should recoil through a stuffing box, and be followed by a valve, which would exclude the water when the gun was not protruded. An elegant model on this construction is now in the possession of his family. He next tried the same piece with a pound and a half of powder, and fired it by means of one of his water-tight locks, when it was entirely in water—three feet below the surface. The ball penetrated eleven and a half inches into a target of pine logs, which had been prepared for the purpose and placed beneath the water at the distance of twelve feet from the piece.

"His next experiment was with a columbiad, carrying a hundred-pound ball, fired at the target as in the last instance. All that we know is, that the ball tore the target to pieces and the cannon was uninjured. We have not information that will enable us to give any further details of this experiment, but we know that Mr. Fulton was entirely satisfied with the result. He proposed to use cannon in this way by suspending them, two for instance, from the bows of the vessel. A single shot, as he demonstrates, from a piece of large caliber, which should break into the side of a ship at any considerable depth beneath the water-line, must be fatal to her. And though the range of shot fired through water may be but a few feet, yet conflicting vessels, whenever they engage yard-arm and yard-arm (with accounts of which our naval heroes have of late made us so familiar), must be so near as to give effect to a submarine discharge.

"Mr. Fulton did not propose that these guns should be always in the water, but that they should be suspended so as to be raised when the vessel was not in action. These plans for the submarine use of cannon were submitted to one of our most distinguished naval commanders, who gave them his decided approbation. He expressed a strong opinion that such an attack would be fatal to any vessel opposed to it; and that it would be extremely difficult for an enemy to evade an attempt, made with sufficient resolution, to destroy her by these means."

A Country without a Reptile.

Capt. Hardy, R. A., writes an interesting letter to the *Field* newspaper, commenting on a statement that in Newfoundland there is not a snake, toad, frog, or reptile of any sort; nor any squirrels, porcupines, mink, or mice. Capt. Hardy says:—"Besides the above-mentioned deficiencies, I found, when visiting Newfoundland last summer, several others. It was midsummer, and the fire-flies were scintillating in myriads in the warm evenings over every swamp in Nova Scotia; here not one could be seen, nor was there another pleasing summer visitor of our neighboring provinces—the night-hawk. Considering the immense portion of this island which is claimed by bogs and swamps, I think the absence of all reptiles very curious; and I plodded long and often round the edges of ponds and swamps, hoping to see some little croaker take a header from the bank; and by sunny slopes in the woods, where, on the mainland they might be seen at every other step, in search of snakes, but all in vain. I believe some of our common green-headed frogs were recently transported to this island and turned out into a swamp such as would be a grand residence for them at home, but in a few days, alas! they all lay stiff on their backs. In fact, Newfoundland seems to be destined to remain as it now indubitably is—a country without a reptile."

American Cast-iron Guns.

The Toronto *Globe* has the following paragraph commenting upon the performance of the XI-inch gun as shown by the targets recently illustrated in the SCIENTIFIC AMERICAN:—"We suppose we should not be justified in arguing that in these experiments we have a sample of the best the American guns can do, but we are warranted in presuming that it offers the fair average performance of the XI-inch cast-iron Dahlgren. We cannot think it otherwise than very poor, far below the expectations we had been led to form from the system of puffing adopted. That the slight effect the shot had is not attributable to the india-rubber used in the target, is evident from the report of the officer, who says, in effect, that it penetrated just as far as in targets minus the additional protection. It is attributable to other causes, easily seen. Although the gun was only eighty-eight feet from the target faced with four and a half inch solid iron, in no instance did the shot pierce its way entirely through. We think we can show a far better record with English guns than this."

[The editor of the *Globe* has read the reports very carelessly; for just above this paragraph, in his own paper, he records the fact that the shot passed clear through. Not one target resisted them in any case. —EDS.

The Oil Supply.

The question of the ability of the oil region to supply continually the demand now made for petroleum is one which is discussed by those interested in the production and trade of the article. The wells which have been sunk are found frequently to diminish in production, and the vicinity of other wells is found also to diminish the productiveness of old wells. From the frequent striking of mud veins, it is assigned by some that the oil supply is becoming exhausted, and that these mud veins are the bottom or bed of the deposit. Some owners have found it advantageous, when a well gives out, to sink it deeper, where they find it yielding an additional quantity, which leads to the supposition that there exists several superincumbent layers of the peculiar mineral from which petroleum is derived, and the oil may be procured at the depth of a thousand feet, as surely as it is at the depth of five hundred feet. This is a matter which has yet to be tested by experiment, but the fact is a highly important one as connected with the permanent supply of an article which has become so considerable an article of trade.

Statistics of the "Reaper" Trade.

But few persons not actually engaged in the enterprise have any very definite idea of the immense proportions the business of manufacturing reapers and mowers is assuming in this country. We have reliable information, says the *Prairie Farmer*, that there were made for the trade of 1862, 33,000 of these machines; for that of 1863, something over 40,000; and, for the business of the present year, upwards of 70,000 will be made. Mark the wonderful increase since the war began. Out of the 70,000 between 14,090 and 15,000 will be manufactured in the State of Illinois. Seventy thousand machines at an average of $130 dollars each (combined machines selling the ensuing season, $150 to $160, or even higher, and mowers from $105 to $140), and we have the enormous amount of $9,100,000 paid by the agriculturists of the North, in a single season, for a single class of instruments. Probably the repairs on machines, old and new, will swell the amount to nearly $11,000,000. Can any country in the world equal or even approach these figures?

SPECIAL NOTICES.

STEPHEN R. PARKHURST, of Bloomfield, N. J., has petitioned for the extension of a patent granted to him on April 23, 1850, for an improvement in cotton gins.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, April 4, 1864.

WILLIAM VAN ANDEN, of Poughkeepsie, N. Y., has petitioned for the extension of a patent granted to him on April 30, 1850, for an improvement in machines for making wrought-iron railroad chairs.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, April 11, 1864.

All persons interested are required to appear and show cause why said petition should not be granted. Persons opposing the extension are required to file their testimony in writing, at least twenty days before the day of hearing.

The American Institute Clubs.

The members of the American Institute have two societies, the Polytechnic Association and the Farmers' Club, both of which hold weekly meetings free to all persons who choose to attend. The meetings of the Farmers' Club are held at 1½ P. M., on Tuesday, at Room 24, Cooper Institute, and those of the Polytechnic Association at 7½ P. M. in the same room. We intend to publish reports of such portions of the discussions of these societies as we think will be interesting to our readers. We wish it distinctly understood, however, that we cannot waste our time and space to notice every "bore" that thrusts himself into these meetings. Whatever is intrinsically good we shall publish.

The Potato Rot.

At the last meeting of the Farmers' Club, Mr. Carpenter said:—"I have read and observed a great deal on the subject of the potato rot, and the sum of the whole seems to be that potatoes planted in moist tenacious soils are much more subject to rot than if planted in dry ground."

Prof. Mapes remarked:—"I had a field, half of which was under-drained, and I planted the whole to potatoes. On the under-drained portion none of the potatoes rotted, while on the other half they all rotted."

MINERAL SALT is now brought in ballast from Russia; it sells for $20 a tun. It is mined in blocks that to the eye appear to be quartz. A thirty-pound block of it, placed in a box in a field, will supply a herd of cows for some weeks. It is as hard as stone. Ordinary salt would dissolve in one-fourth the time. No other country yet known yields this peculiar product. It is quarried precisely as we quarry marble.

RIMMERS must not be used in the cored-out holes of castings. The scale and sand ruins the tool in a short time.

PICKLING castings of iron is the best way to remove the sand adhering. One bulk of sulphuric acid to ten of water is a good bath.

THE New Haven Clock Company manufactured 200,345 "movements" last year, 20,000 of which were exported.

WHEN chipping wrought-iron the chisel should be dipped in greasy waste, occasionally; the labor is much reduced thereby.

Improved Feed-cutter.

Hardly any innovation of the day is more remarkable than the change of opinion and practice which has taken place in feeding cattle and other stock. Twenty years ago rough feed, or hay in bulk, and such fodder was thought fully sufficient for stock, and the change which has taken place in this respect is very marked. The columns of the various agricultural papers in this country are continually occupied with discussions upon the subject of stock raising, food for horses, cattle, &c. By some, chopped feed is recommended, by others cooked roots, &c., and each and all kinds, methods and plans are animadverted upon in turn to the great benefit of the farmer.

The subject of the engravings presented herewith is a new machine for cutting feed, hay, straw, corn-stalks, &c., and embodies in its construction some points not hitherto embraced in machines of its class. It will be seen on referring to Fig. 1, the perspective view, that the machinery is mounted on a wooden frame, A. The material to be cut is entered at B, and is drawn under the knife, C, by the action of the rollers. The knife is somewhat peculiar inasmuch as it is so made that it will produce a drawing cut, and enter the fodder gradually and without shock or jar; it is fastened to the arms, E, which have counterbalances, F, on their opposite ends, so as to make the machine work regularly and without vibration; for the knife runs at a high velocity. The edge of the feed-board, B, is provided with a metallic edge, against or up to which the knife works so as to clear it. This plate can be moved up so as to compensate for wear. The action of the feed rollers is a novel feature of this machine, for no matter what the thickness of the substance cut, they are held always in the same relative position with the knife, from which circumstance they work much more efficiently. This action is obtained in the following manner:—There are two feed rollers, G and H; the latter having ribs to assist in performing its functions. The shaft of the feed roller, H, runs in bearings in the bars, I (see Fig. 3), one upon each side of the machine. These bars are connected to each other at the bottom by a rod, and to this rod a spiral spring, J, is attached (see Figs. 2 and 3) which runs to the bottom of the frame and is there permanently fixed. The upper ends of the bars, I, are connected to each other by a board or thin iron plate, K, to the back of which another plate, L, is attached, as shown in Figs. 2 and 3. The spring, J, keeps the upper roller down upon its fellow, and the shaft of the upper roller has two hubs, one on each end, which work in curved slots, M, made in the plates, N (see Fig. 2), set on each side of the feed box. These slots are struck from the center of the cutter shaft, therefore as the upper roller rises with the feed introduced to it, it is always in the same distance from, or relative position, with the cutter. By this feature of the machine the fodder is firmly held to the knife and the best possible results obtained. The gearing to effect the rotation of the roller, H, is thus arranged. The lower roller has a pinion, O (see Fig. 3), attached to its shaft, said pinion driving another one, P, which runs in the curved bar, Q; this pinion gears with another, R, above it, constituting a train of three wheels. The pinion, R, engages with a fourth wheel on the shaft of the upper roller, and is kept to its work by means of a link, S, between the two; by this arrangement the rollers are driven continuously without interference with the position of the upper one. The board, K, is attached to prevent hay from being drawn over the top of the upper roller; this board works up and down with the roller. There is also a sheet-iron guard, T, which prevents the cutter from being injured, as well also hay from flying to waste all over the floor, and the cut feed is delivered through the chute, U, into bags or baskets as may be desired. There is one other peculiarity about this machine which deserves notice; this is to prevent injury to the knife or cutter from any hard substance which might accidentally or designedly be introduced with the fodder to be cut. The fly-wheel, V, is fastened to its shaft by a nut and washer; there is no key in it, as is usual, and the adhesion necessary to enable it to perform its duty, is given by the nut aforesaid in connection with two wide collars. The idea of this arrangement is to allow the fly-wheel to slip on its shaft when the cutter strikes a hard substance, thus taking the strain due to its momentum off from the cutter—a very simple and excellent contrivance. The cutter shaft is driven by the spur gear, W, and a pinion, and has a high velocity. The other gears, on the opposite side of the machine in Fig. 1, work the lower feed roller.

Fig. 1

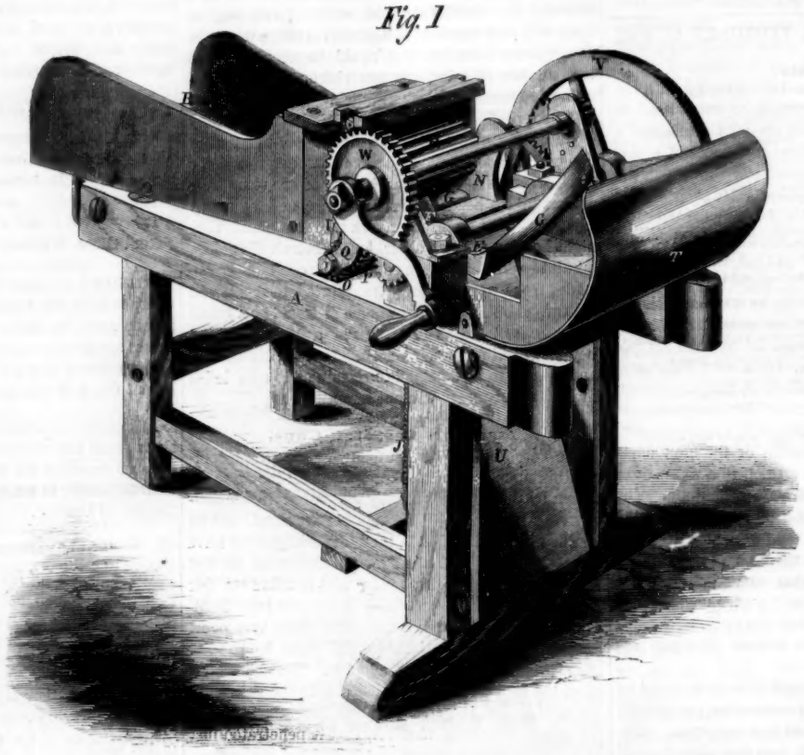


Fig. 2.

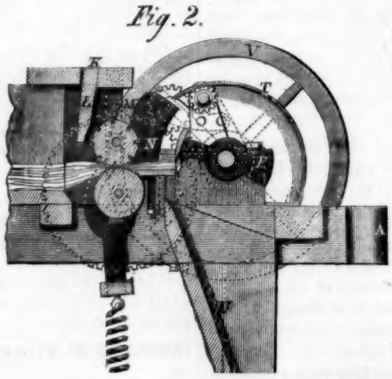
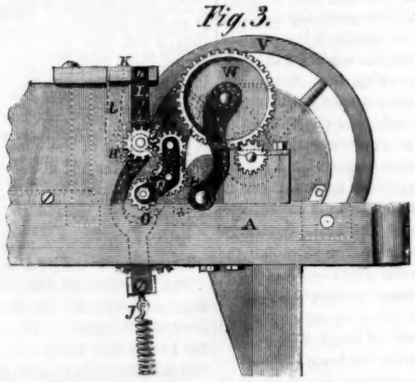


Fig. 3.



HUNT'S "HOOSIER" FEED-CUTTER.

This machine will be found a most useful one to farmers of every class. The arrangement to prevent the knife from being damaged is a very good one; this part of the machine is more costly than any other single detail, and those farmers who live at a distance from the centers of trade find it difficult to get good cutter blades made by ordinary blacksmiths, in the event of accident to the one furnished with the machine. All reasonable chance of injury to this cutter is avoided by the arrangement previously spoken of.

This machine is the invention of F. B. Hunt, of Richmond, Ind., and a patent was granted on the 5th of January, 1864, through the Scientific American Patent Agency. Foreign patents are also being secured by the inventor through the Scientific American Patent Agency. For further information address the patentee as above.

POWER FROM BELTING.

In most of our cities and manufacturing villages steam power is rented extensively for driving machines. Owners of many large buildings put in powerful steam engines, hire out different rooms to small manufacturers, and supply the power from the engine by belting to drive the machines in the different rooms. The custom is to rent so much horse-power, and this is or ought to be measured by the width of belt and its velocity. In justice to those who rent and hire steam power in this manner, there should be a fixed standard of a horse-power communicated by belting; and yet we know there have been and still are differences of opinion upon this subject. On page 392, Vol. IX. (new series) of the Scientific American, we published a rule for calculating the power of belting, and also presented a unit for a horse-power, which is 800 feet velocity per minute for a 1-inch belt, or 400 feet for a 2-inch belt and so on. A manufacturer in this city, who hires his steam power, was told by the maker of a grinding mill which he runs, that it would require five horse-powers to drive it; and according to the above rule this was exactly the amount of power of the belt which he hires. He was, however, charged rent for six horse-powers, and the landlord asserted that this amount was supplied, but furnished no evidence to prove it. There are machines specially designed for testing the power conveyed by shafting, but what is wanted is a reliable standard for the horse-power of belting. The person who hires should not pay for more power than he receives; and the one who rents the power should receive neither less nor more than the price for what he supplies. As there are differences of opinion as to the horse-power of a belt, we suggest that those who supply power by belting ought to publish their rules and the standard which they have set up, in order that this standard may be examined and tested, and all differences of opinion upon the subject settled.

Don't strike finished work with a hammer, take a piece of hard wood instead.

THE

Scientific American.

MUNN & COMPANY, Editors & Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

VOL. X. NO. 7...[NEW SERIES.].....*Twentieth Year.*

NEW YORK, SATURDAY, FEBRUARY 13, 1864.

Contents:

(Illustrations are indicated by an Asterisk.)

INVENTION, THE ALLY OF CIVILIZATION.

It is a little singular, when we reflect upon the subject, that the physical construction of the globe is essentially the same to-day as it was 3,000 years ago. It is true that rivers have diverged from their courses, that the sea encroaches upon the land, and that lands are reclaimed from the sea; that volcanic mountains vomit forth their contents and lay waste the fairest and most fertile countries; that mines cease to give up their treasures, and that new ones are being discovered in their places; yet one might suppose, in view of the never-ending supply of new and useful tools, machines, apparatuses, processes and labor-saving appliances, that a new world had been discovered, teeming with boundless wealth, and also with suggestions ready made for the benefit of inventors and the elevation of the best interests of mankind.

No! it is not so. All the world is the "old world" as it came forth from the hand of God; as it started in its orbit to move forever, until checked by the same power that imparted the first movement to it. This assertion does not relate to the labors of man in drawing forth from the natural productions of the globe all that is useful and beautiful; and we merely call our readers' attention to the fact that, while the physical construction of the earth remains the same, the ingenuity of man is continually changing its social and political aspects. Where once the wild savage stalked and screamed his fierce war-whoop through the forest, a mightier than he now whirls upon its way; not indeed a foe to the advancement of mankind, but an ally, an aid to it. The roar of the railroad train, the shriek of the steam whistle, the clatter and jar of the factory-loom, the quick, sharp twitter of the sewing-machine, the incessant rustle of the reaping-machine through the grain, the splash of paddles, the miles on miles of telegraph wire, the hoarse booming of the rifled guns crashing their shot against impenetrably-mailed ships, the far-ranging rifles and small-arms—all these are the types and exponents of civilization as much as the savage is a symbolization of the rudest, wildest, and most uncultivated stage of the world's existence.

Behold how invention has shortened the labor of men! and how each year seems to bring us nearer to that social millennium when the fullest and most perfect development of the world's resources would seem to have been attained! In times of peace, when the arts are undisturbed by other causes, then indeed civilization makes long strides toward reducing the world to a state of cultivation and prosperity. Even when the nervous arm and the iron heel of War overruns the land, it is only by strenuous effort and arduous application that invention is able to repair the mischief, by bringing forth still better machines, more effective processes and methods than existed before. Therefore in one sense war is a benefit because it stimulates men to greater efforts. In any case, invention is the true ally of civilization. The ax, the hammer and the saw are good in their place; likewise the plow, the loom, and the anvil; but if the world were to wait on the capabilities of these simple instruments to supply its wants, the age would be backward indeed. The progress of the period is gratifying in the extreme, and he is indeed a far-sighted individual who can predict where or when it will cease. Invention succeeds invention; no sooner are the public wants manifested than they are satisfied; and the tendency of them is to make the world wiser and better. Even warfare itself will soon be made so destructive to life that none can be found to engage in it, and nations will learn that the arts of peace are those which advance their interests more swiftly than force, fraud, or diplomacy.

"MACFIE" ON PATENTS.

Our foreign cotemporaries are just now excited over the conduct of an individual named "Macfie." This ingenuous personage has raised a storm of honest indignation about his ears for simply writing what is called a "tract," comprising only 100 pages. The title of this publication is "The Patent Question," and in it Mr. Macfie proposes to show that the granting of patents do great harm to traders, but especially to those who do traffic abroad. This grievance (says Macfie in effect) should be suppressed; and to this end he suggests that patents should only be granted for three years, and after that time publicly appraised; and the value, not exceeding $5,000 in any one case, to be paid over to the patentee. If this person does not happen to be the real inventor (as is often the case in Great Britain and some other foreign countries), the injustice of such a proceeding is manifest at once. But there are other awards to be given to men of genius; medals are to be struck off—possibly electroplated ones—and ribbons are to be presented as incentives to still further research; and the modern inventor who has perhaps spent years of toil in bringing forward his machine or process—the man who has lightened the labor of the world, and made plenty where famine once reigned—these benefactors are to be stuck over with brass and streamers till they resemble New Zealand savages or a ship newly launched.

The proverb says "Republics are ungrateful;" but if Macfie's little proposition is acted upon, what shall be said of Principalities and Powers? Supposing after all the time and toil which Wilson bestowed upon his sewing machine, that our Government appraised its value at $5,000 and, handing over that sum, together with a red ribbon and a brass medal, set him adrift! With what justice then might we not repeat that "republics are ungrateful." We might bring Morse into consideration, Colt upon the stand, Manny, McCormick and others, as evidence in point that such an absurd proposition as Macfie's shows little knowledge of trade, the first principles of the value of a patent, or even expresses sentiments of common justice. And yet this gentleman is chairman of the Liverpool "Chamber of Commerce!" Herein we find the key to the whole matter; this fact, connected with the assertion that "patent laws are an injury to trade" (the silliest and the baldest nonsense ever uttered), shows convincingly the animus of the writer. Says Macfie, substantially:—"Here is a greasy inventor; he has no education, he has neither money nor friends; but by his ingenuity he has constructed a machine that accomplishes ten times as much as was formerly done, and he is in a fair way to make money—to 'get on' in life. In the meanwhile, however, what are the distanced competitors in trade to do? This machine will revolutionize the trade; it is in this respect an injury to it, we can't compete! What must be done?"

Why what, of course, but to abolish the patent laws! Take away the legal protection afforded to talent and ingenuity, rob the inventor of his discovery, and what is the result? Simply a return to the old time processes, the slow methods in vogue ages ago; that is one way to benefit trade. And this is just what Macfie proposes to do. He has not honored us with one of his pamphlets, but we gather our facts from the London *Engineer*, and we are pleased to see the vigor with which our contemporary repels this attack upon the rights of inventors—a common brotherhood of genius all over the world.

TUNGSTEN AND ITS ALLOYS.

Some important and interesting experiments have lately been made in France, by order of the Minister of War, to determine the influence produced by *tungsten* upon gun-metal, steel and cast-iron, when combined with them and forming alloys. Tungsten is one of the rare metals, which the great majority of persons have never seen. Its name signifies "heavy stone," and it is also called *wolfram*. In its native state it is found as an ore associated with iron, manganese, sulphur and arsenic. It is reduced from the ore by fusion with carbon, and with a current of hydrogen gas. In the metallic state it is difficult of fusion, hard, brittle and gray in color. There is only one mine of tungsten ore in France. When roasted the sulphur and arsenic are driven off, leaving iron and manganese combined with the tungsten. The experiments, which were conducted by M. Caron, satisfactorily proved that when one per cent of tungsten was added to cast-iron, the grain of the latter became more regular, and there was greater homogeneity exhibited. The addition of one per cent of tungsten to steel increased its hardness and tenacity. A steel rifle barrel, containing that amount of tungsten, was subjected to severe tests, and it withstood larger charges of powder and heavier shot than any other steel barrel of the same dimensions tested. M. Caron recommends the employment of tungsten in all French steel to improve its quality. On the other hand it was found that tungsten was incapable of forming true alloys with copper, tin and gun-metal; it mixed with gun-metal, but rendered it less homogeneous and tenacious.

AMERICAN FLAX-COTTON AND MACHINERY.

We have repeatedly called the attention of our readers to the importance of developing flax culture throughout the Northern States. This valuable fiber may now be extensively cultivated and employed in various manufactures, and a favorable opening exists for the invention and introduction of improved machines to clean and prepare it for spinning. The subject is already receiving considerable attention, and we anticipate that the time is not far distant when this branch will become one of the great manufacturing industries of the country. We have recently received from Joseph Taylor an excellent sample of flax-cotton such as is now being made at Lockport, N. Y., by the Lockport Flax-cotton Company. The fiber is white and strong, much resembling coarse wool, and it is made up in battings, which find a ready market. Considerable quantities are sold to woolen cloth manufacturers who mix it with wool as a substitute for cotton. The Company has appliances for producing about 2,000 lbs. per day; but our correspondent states that an improved machine for cleaning the flax so as to free it completely from shives, also a good carding machine, are much needed. This Flax-cotton Company has been in operation but little over a year, and during that time several valuable improvements have been made, yet there is an ample field for many more.

AMERICAN STEEL AND MACHINE-CUT FILES.

New branches of industry, embracing many improvements over old modes of manufacturing, are being continually developed, and especially has this been true since the beginning of the war, which has taxed the productive resources of the country to their utmost. Among the many new industries which have sprung up, as if by magic, is that of manufacturing files by machinery. At Bridgeport, Conn., a few days since, we witnessed the operation of file-cutting by a very simple yet beautiful mechanical contrivance. The steel was operated upon by a hammer-chisel, which produced the same effect as if the blow had been struck by hand, but of course much more rapidly. The files also appeared to be quite equal to those made by hand, and the manufacturers assured us that they gave equal satisfaction.

We learn (from the *Commercial Bulletin*) that the Whipple File Manufacturing Company at Ballardvale, Mass., is also doing a very large business in manufacturing files by machinery, and that no less than one hundred and forty machines are now in operation and forty more are being built. The *Bulletin* states that this Company manufactures their own steel, which is of a superior quality. Several tuns of it are now turned out daily. We believe that this is the

only file establishment in the country where the steel for the files is manufactured on the premises. Hitherto all the steel that had been used for American-made files was imported from England. It therefore affords us pleasure to make a record of the enterprise of the Whipple File Manufacturing Company.

On page 22, Vol. XIV. (old series) of the SCIENTIFIC AMERICAN, we gave a very full description of the processes and operations involved in the manufacture of files by hand; and we said:—"It seems reasonable that machinery might be constructed to cut files as well, in every respect, as can be done by hand." This opinion has now been confirmed, although at the time it was penned, many practical file-makers with whom we had conversed, believed that a machine could not be made to put the same burr edge upon files, as a skillful hand-cutter. We also said in that article, with respect to the steel:—"Our steel comes from England, while the Sheffield file-makers manufacture their own steel, and are thus enabled to meet rivals in every market in the world. Until we make our own steel (and we do not see why we should not do it), our toolmakers must labor at a great disadvantage in competing with those tools which come from abroad." This suggestion has met with consideration, and the results are indeed gratifying.

THE PRESSURE PRODUCED BY GUNPOWDER.

Professor Barnard, of Washington, has communicated to *Silliman's Journal* an article on the pressure produced by burning gunpowder in a cannon, in which he shows that the several experimenters differ very widely in their results; some stating the pressure at 7,000 or 8,000 lbs. to the inch, and others at more than 200,000. Professor Barnard objects to all of the methods pursued by the different experimenters, and then remarks that we finally have an investigation which leaves nothing to desire—the investigation made by Messrs. Bunsen and Schischkoff. These eminent chemists analysed all of the substances resulting from the combustion of gunpowder, and calculated the pressure which they would exert if confined in the space occupied by the powder before it was burned; taking into account the specific heat of the several substances. Professor Barnard remarks that the powder was burned under the pressure of the atmosphere only, and expresses the opinion that the result would not be materially varied by that circumstance.

The best chemists in this city assert, on the other hand, that the burning of gunpowder under the pressure of the atmosphere only, affords no criterion whatever of the effects which would be produced by burning it behind a heavy shot in a cannon. By confining the powder, the heat would be far more intense, and this intense heat would cause an entirely different class of compounds to result from the combustion; thus destroying the foundation of the calculations.

We will also suggest another objection to this investigation. The specific heat of the several products varies with the temperature, and at the high temperature in question has not been ascertained.

Captain Rodman's plan of measuring the pressure of the gases resulting from the combustion of gunpowder in a cannon would seem, at first thought, to be unobjectionable. This plan has been illustrated in the SCIENTIFIC AMERICAN. It consists in boring a hole through the wall of the gun and screwing into this hole a hollow cylinder fitted with a solid piston, the outer end of the piston being of diamond form. When the gun is fired, the pressure of the gas drives the end of the piston into a sheet of pure copper to a depth varying with the pressure. The piston is afterward forced into another piece of pure copper to the same depth by means of a press, the force of which may be measured, and the pressure of the gas is taken to be the same. It has been objected to Rodman's method that the inner end of the piston not being in contact with the powder, the gases would acquire a very high velocity in passing outward through the hole in the wall of the gun, and would strike the piston with a force far exceeding their pressure. It seems to us that there is force in this objection.

Captain Rodman found a pressure, in one instance, as high as 180,000 lbs. to the square inch, and it has been objected by Mr. Fisher, of this city, that such pressure would crumble the cannon to dust—the power of cast-iron to resist a crushing strain seldom if ever exceeding 120,000 lbs. to the square inch. The reply to this is, that the pressure does probably crush the iron within the scope of its influence; but, as the pressure is only momentary, it is exerted only upon the surface—causing an enlargement of the bore. Captain Rodman says that the pressure ordinarily produced in a cannon would blow the gun to pieces if it were not instantly relieved.

As the objection raised by Professor Seely and Professor Everett to the investigation by Bunsen must be as familiar to that eminent chemist as his A B C's, we cannot help suspecting that there may be some error in our account of his inquiry. It will be seen, however, by an extract in another column, that the President and many Fellows of the Royal Society are of opinion that the subject has never yet been properly and thoroughly investigated. Bunsen's calculation gave a pressure of 65,000 lbs. to the inch, and there is no reason to suppose that his method would make the pressure any less than it really is. We invite the attention of our men of science to this interesting subject.

OUR SUBSCRIBERS.

At the commencement of this volume of the SCIENTIFIC AMERICAN we made an appeal to our friends to aid us in extending its circulation. The response to the appeal has been most noble and gratifying; and to all those valued friends we return for their kindness our warmest thanks. Our paper is not large enough to publish the names of all, as we would like to do; we therefore select only those who have taken the trouble to get up large clubs:—

AMERICAN WATCH COMPANY	Waltham, Mass.
BASSETT, C.	Massillon, Ohio.
BELL, J. W.	St. Louis, Mo.
BLANDY, H. F.	Zanesville, Ohio.
BRADISH, A.	Decorah, Iowa.
COOPER, C. & J.	Mount Vernon, Ohio.
CROSS, C. H.	Pulaski, N. Y.
DUNNELL, J.	Pawtucket, R. I.
DUVINAGE, I.	Owego, N. Y.
FLUKER, F. F.	Provincetown, Mass.
FOSDICK, S. W.	Clinton, Mass.
GARST, JOHN	Dayton, Ohio.
GOODELL, DeB.	Elmira, N. Y.
HALTEMAN, A. K.	St. Louis, Mo.
HAGERMEYER, G.	Big River, Cal.
HEMINGWAY, H. N.	Des Moines, Iowa.
HILL, C. F.	Hamilton, Ohio.
HOLMES, JONAS	Clayville, N. Y.
HUBBARD, C. S.	Whitneyville, Conn.
JONES, WILLIS	Bridgeport, Conn.
LATHROP, G. W.	Weedsport, N. Y.
LYMAN, T.	Sandusky, Ohio.
McCONNELL, J.	Iowa City, Iowa.
MARSTON, F. J.	Houghton, Mass.
MILLER, E.	Meriden, Conn.
MOSES, W.	Buffalo, N. Y.
NEWCOMER, G.	Meadville, Pa.
NIXON, W.	Adrian, Mich.
ORAHOOD, H. M.	Black Hawk, Col. Ter.
REED & CO., G. W.	Montreal, C. E.
ROBINSON, H. C.	Monmouth, Ill.
SAGER, M. S.	Washington C. H., Ohio.
SHORT, W. A.	Malone, N. Y.
STRUNK, D.	Janesville, Wis.
THOMPSON, C. B.	St. Catherines, C. W.
VAN FRIES, H. S.	Hollidaysburg, Pa.
WARFIELD, G. W.	Fitchburg, Mass.
WICK, JR., C. B.	Sharon, Pa.

"Yet," we say, "there is room for a few more." Our subscription list is not quite full; and we appeal again to our many thousands of readers to "follow in the footsteps of their illustrious predecessors."

PRESENT STRENGTH OF THE BRITISH NAVY.

The official annual return of the number, name, tunnage, station, and every particular regarding the steam and sailing ships composing the British Navy, together with the horse-power and armament of each, has been published under the authority of the Lords Commissioners of the Admiralty. The total strength of the effective ships of the navy on the 1st of January was 975 of all classes, not including a number doing duty in the various harbors both at home and abroad, the whole of which would be speedily converted into block ships for the defence of the coast, together with a numerous fleet of iron and wooden mortar-boats laid up at Chatham. Of this number there are 72 vessels ranking as line-of-battle ships, each mounting from 74 guns to 121 guns; 42 vessels of from 60 guns to 74 guns each; 94 steamers and other ships, carrying an armament of from 22 to 46 guns each, and the majority of which are of a size and tunnage equivalent to line-of-battle ships; 25 screw corvettes, each carrying 21 guns; and 500 vessels of all classes, including iron ships of great power and tunnage, carrying an armament of from four guns to 21 guns each. Exclusive of the above there is a squadron of 185 screw gunboats, each mounting two Armstrong guns, and nearly the whole of which are fitted with high pressure engines each of 60-horse power. The total number of ships of all classes in commission and serving in nearly every part of the world is upwards of 300, the remainder being attached to the reserved squadrons at the various naval ports, and partially equipped in readiness to proceed to sea whenever their services may be required.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week: the claims may be found in the official list:—

Machine for dressing Slate.—This machine consists of a rectangular frame which may, if necessary, be mounted on wheels for the convenience of transporting or removing the machine from one locality to another. This frame is provided with a fixed knife and also suitable bearings for a lever or sword arm which carries a movable knife. This sword arm is suspended by a spring or springs, so that when in a normal position the movable cutting edge is raised above the lower knife edge, and the two edges resemble a pair of open shears and act in the same manner. A treadle frame is attached by means of a link to a lever, which is upon the same spindle as the sword arm, and the knife edges are brought together by the pressure of the foot of the workman, or, if desired, the machinery may be worked by mechanical power, by applying power to the treadle lever, or the treadle lever may be dispensed with and the power may be applied direct to the sword arm. The spindle of the sword arm is made adjustable to compensate for wear in the cutting edge and other working parts and a gage plate with suitable marks or points, corresponding to the different recognized sizes of roofing slates, is placed on the frame-work, so that the rough slates may be laid in their proper places and adjusted with facility. If desired a double set of shears or cutting edges may be employed, so that two sides of the slate may be cut, trimmed or dressed at the same time, but this will not be found a convenient arrangement in practice. C. E. Amos, of Southwark, London, England, and John Francis, of Penrhyn, North Wales, are the inventors of this improvement.

Skate Fastening.—This invention consists in the employment of revolving cam buttons attached to the sides of the runners and acting upon the ends of the straps which serve to fasten the skate to the foot in such a manner that by turning the cam button after the strap has been drawn tight, the end is firmly clamped between the edge of the slot in the runner, through which it passes, and the point of each cam button and the ordinary buckles or other tedious fastenings can be dispensed with. Geo. P. Schifflin, of New York city, is the inventor of this improvement.

Punching Press.—This invention consists in the combination with the rod or pitman which connects the main shaft of the press with the slide carrying the punch or side of an adjustable eccentric and clamp in such a manner that by rotating said eccentric the position of the punch or cutter in relation to the work, can be adjusted with the greatest facility and with perfect accuracy, It consists, further, in the arrangement of a slide with triangular guides operating in two jaws cast solid with the stock of the press and held in place by a triangular gib, in such a manner that all the bearing points or surfaces of the jaws and of the carriage can be planed off by one operation and without changing the position of the piece to be planed on the bed of the planing machine, and consequently all these surfaces must be perfectly parallel; and furthermore, the set screws used to adjust the gib

or gibs bear square on a flat surface so as to allow of setting and retaining said gib or gibs with the greatest accuracy. It consists, also, in a touch-off motion o peculiar construction, whereby the clutch-pin is moved by the direct action of the cam. And, further, in the use of a loose clutch-pin, the position of which is entirely controlled by the direct action of the cam and is not made dependent upon springs or other mechanical devices. Also in the application of a yielding coupling-pin in combination with the clutch-pin and cam is such a manner that if the clutch-pin is pushed out when it stands opposite to the coupling pin, the latter will yield, and injury to the working parts of the press will be prevented. Finally, in attaching the cam motion to a yielding pin to prevent an accident in turning the press back. N. C. Stiles, of West Meriden, Conn., is the inventor of this improvement.

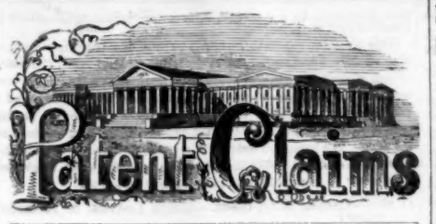
Machine for cutting Slats for Window Blinds.—This invention relates to a machine for cutting the thin slats which are used for making inside rolling blinds for windows, and it consists in the employment of adjustable cutters and a stationary concave and a gauze wire, all arranged in such a manner as to admit of the slats being cut from the bolt by simply shoving the latter along over the cutters, the device being capable of cutting the slats both from straight and cross-grained wood. G.H. Denison, of Suspension Bridge, N. Y., is the inventor of this improvement.

Manufacture of Soap.—This invention consists in a composition of grease, flour, sal soda, borax, salt tartar and alkali, which are mixed together in suitable proportions and in a peculiar manner, so that by the combination of the flour with the grease the latter is enabled to combine with a much larger quantity of alkali than it can without the flour, or when the flour is first mixed with the alkali and a soap is produced which is not liable to shrink and possesses superior washing qualities. S. A. Sealy, of Brooklyn, N. Y., is the inventor of this improvement.

Securing Boiler Tubes.—The object of this invention is to so apply the tubes in the two tube sheets of a boiler as to make very tight joints and to provide for their easy removal when necessary to repair or renew them. The tubes are screwed into tapped holes in the two tube sheets, the holes in one sheet being larger than those of the other, and the corresponding ends of the tubes are enlarged to fill the larger holes by means of taper thimbles which screw on to the tubes and into the latter holes, and it is in such enlargement of the tubes at one end that the invention consists. James Howell and David Birdsall, of Jersey City, N. J., are the inventors of this improvement.

Steam-pump and Boiler Feeder.—This apparatus consists, essentially, of a hollow or chamber shaft, from the opposite sides of which project arms carrying hollow balls or chambers which, being alternately filled with water and with steam, impart, by the gravity of the water, a rocking motion to the shaft. The opposite sides of the apparatus are thus thrown into alternate communication with a steam boiler and with an elevating condensing chamber, the water descending from which displaces the steam within the oscillating balls, causing the said steam to ascend to the condensing chamber and pass down through a pipe within the same, by which means it is instantaneously condensed without previous expansion, producing a partial vacuum within the condenser, and thus causing water to be supplied thereto from any suitable external reservoir. The apparatus is entirely automatic in its action, and by means of the alternate pressure and condensation of steam, may be made to elevate or force water for any purpose desired. When employed for supplying steam boilers, the parts are so arranged that when thrown into communication with the boiler, the water will descend into it by its gravity in a manner common with boiler feeders. The inventor is Mr. George I. Washburn, of Worcester, Mass.

WANTED—TAR FOR PAINT.—A correspondent connected with one of our telegraph companies informs us that coal tar is a good non-conductor and an excellent preservative for telegraph posts, but when applied cold it washes off. As it is difficult and inconvenient to apply it hot for such purposes, he desires us to call the attention of inventors to this subject, in order that they may make efforts to combine some other substance with it, so as to apply it cold and render it permanently adhesive.



ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING JANUARY 26, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

41,353.—Machine for dressing Slates.—C. E. Amos, Southwark, England and John Francis, Penrhyn, North Wales. Patented in England, July 27, 1863 :

I claim a machine for dressing slates, constructed and operating substantially as herein shown and described.

41,354.—Drum Stove.—A. S. Ballard, Mount Pleasant, Iowa :

I claim the combination and arrangement of the base, A, annular drum, B, damper, C, and pipes, D and E, the whole forming a parlor heating drum, constructed and operating substantially as herein set forth.

41,355.—Cooking Range.—A. C. Barstow, Providence, R. I.:

I claim, first, locating two ovens, one over the other, back of and above the fire, substantially in the manner hereinbefore shown and described.

Second, Forming around the range a mantle composed of jaws and a rear plate supporting a top plate under the arrangement substantially as herein described.

Third, The employment of a pendant door hung upon hooks on either side of the oven, in such manner that it shall perfectly close the opening thereof, while its removal may be effected by lifting without interfering with the boilers, substantially as set forth.

41,356.—Barrel-head Machine.—Alfred Benster, Detroit, Mich.:

I claim, first, The employment or use of the revolving planer, C, as described, for the purpose of turning, planing and chamfering barrel heads at one operation.

Second, The revolving toothed rings, G G′, and rising and falling frames, H H′, in combination with the planer, C, constructed and operating in the manner and for the purpose substantially as described.

Third, The turn-table, J, in combination with the toothed rings, G G′, and cam, L, constructed and operating substantially as and for the purpose specified.

Fourth, Imparting to the rings, G G′, turn-table, J, and revolving cutter, F, a rising and falling motion by the action of the cam, L, as and for the purpose set forth.

Fifth, The rising and falling standard, I, hinged board, K, and lever, R, in combination with the cam, L, frames, H H′, and sash, Q, all constructed and operating substantially as and for the purpose described.

Sixth, The eccentric shaft, B, with cog-wheel, S, in combination with the toothed ring, G′, constructed and operating substantially as and for the purpose set forth.

Seventh, Imparting to the head to be turned an eccentric motion under the planer, as and for the purposes specified.

[The object of this machine which forms the subject of this invention is to plain the upper surface of a barrel head to the desired oval shape, make the upper and lower chamfers impart to said head the desired elliptic shape, revolve, clamp and loosen the some automatically, without the assistance of the operator, who has nothing else to do but to arrange the pieces for a head on a table in front of the machine and push the same in, and in doing so the finished head is pushed out on the opposite side of the machine and deposited on a table situated in a convenient position to receive the same.]

41,357.—Filter.—Benjamin Best, Dayton, Ohio :

I claim, first, The construction of the box, A, with removable perforated partitions, a b, in combination with the perforated cylinders, B′, space, c, and jacket or casing, C, substantially as and for the purpose described.

Second, I claim the combination of an upper horizontal detachable filter, A, with a lower permanent vertical filtering chamber, B′, substantially as and for the purpose set forth.

Third, Third, The combination of the horizontal filtering box, A, with the upright filtering chamber, B′, passage, e, and outlets, f f, arranged and operating substantially as described.

41,358.—Spring Bed-bottom.—George Bevis, Rochester, N. Y.:

I claim as a new article of manufacture a continuous and elastic bed-bottom, composed of the slender yielding rounds or slats, a a, secured closely together in any manner by the cords, b b, or equivalents, substantially as herein described.

41,359.—Blacking Brush and Holder.—Daniel Bowker, Boston, Mass.:

I claim my improved combined brush and blacking holder, constructed substantially in the manner and for the purposes as above described.

41,360.—Endless Chain Propeller.—W. W. Bowman, Graves county, Ky. Ante-dated Jan. 20, 1864 :

I claim the arrangement and construction of the chain propeller, with inside and outside paddles operating upon open toothed wheels, all in combination as herein described and for the purposes set forth.

41,361.—Slide Valve of Steam Engines.—Jacob Bradley, St. Mary's, Ohio :

I claim the slide valve, E, having two cavities, g g′, in combination with the system of ports c c′ d d′ e, communicating with the high and low pressure cylinders, steam chest and exhaust pipe, substantially as herein specified.

[This invention relates to that class of steam engines in which steam of a high pressure is first used in a cylinder of small diameter and afterward at a lower pressure in a cylinder of larger diameter. It consists in an improved slide valve and system of ports for effecting the induction and eduction of steam to and from the two cylinders.]

41,362.—Truss-pads.—Albert Bridges, Jersey City, N. J.:

I claim attaching the hollow elastic ball to the truss spring by means of the headed pin, d, and screw nuts, e and f, the head of said pin being introduced within the ball, as specified, and in combination with the elastic ball and pin, d, I claim the cap, e, for the purpose of retaining the ball in its proper position as specified.

And I claim regulating the elasticity of the hollow pad by the action of the air confined within it by the screw, i, or its equivalent, as set forth.

41,363.—Leather-rolling Machine.—J. G. Busfield, Feltonville, Mass.:

I claim the combination and arrangement of the levers, c c, and treadle, N, placed within the frame, A, and connected by the adjustable rods, Q Q, substantially as and for the purpose set forth.

I further claim the adjustable bearings, f f, of the roller, L, placed in the levers, c c, when used in combination with the treadle, N, and the roller, B, for the purpose herein specified.

[This invention relates to a new and useful arrangement of lever frame in which the lever and adjustable roller is hung, whereby said roller may be raised and lowered to regulate the pressure on the leather as may be desired without in the least affecting the gearing by which the lever or adjustable roller is driven. The invention also relates to an improvement in attaching the treadles to the lever frame of the adjustable roller, whereby the movement of the former may be regulated as desired, and the invention further relates to the employment or use of adjustable bearings arranged in the lever frame to receive the journals of the lever or adjustable roller to admit of the independent adjustment of the latter as may be required.]

41,364.—Sail Cringle and Clew.—Frederick Chandler, Charlestown, Mass.:

I claim a metallic cringle of two parts for grasping the rope and sail; these parts held together by screws or rivets, the whole constructed and the parts thereof arranged, substantially as and for the purpose specified.

41,365.—Submarine Boat.—James Carver, Bellvue, Ohio:

I claim the employment or use of the vertically-swinging adjustable pins, B, at or near the bow of a boat, A, constructed and operating in the manner and for the purpose substantially as herein shown and described.

Second, The tank, D, containing inflammable liquid in the hull of a submarine boat, in combination with a suitable pump, W, and pipes, 5 6 7, all constructed and operating in the manner and for the purpose substantially as set forth.

Third, The vertically-adjustable propellers, M′, in combination with the boat, A, constructed and operating in the manner and for the purpose substantially as specified.

Fourth, The regenerator, R, in combination with the steam generator, G, and boat, A, constructed and operating substantially as and for the purpose specified.

[The object of this invention is to produce a submarine boat, the motion of which can be perfectly controlled in every direction, two vertically adjustable screw propellers being provided to cause the boat to descend to any desired depth or to ascend to the surface, one ordinary propeller at the stern and two hinged wings or fins at the bow for the purpose of propelling the boat and of directing its course upward or downward.]

41,366.—Hitching Strap.—Peter Conover, Kingsessing, Philadelphia, Pa.:

I claim as an improved article of manufacture a hitching strap, provided with a safety ring, D, near the buckle, and otherwise constructed as herein shown and described.

[This invention consists in the application to a hitching strap of a ring large enough to admit of passing through it the snap at the loose end of the strap and at a distance of about three inches (more or less) from the buckle which serves to attach said strap to a post or tree, in such a manner that on applying the strap to a post or tree a strain exerted on it is not able to disengage the same from the tongue of the buckle, and furthermore, by such strain the strap is drawn up to the post or tree with increased tightness, thus preventing it from slipping down to the great inconvenience of the horse and of the persons having charge of the same.]

41,367.—Machine for cutting Slats in Window Blinds.—G. H Denison, Suspension Bridge, N. Y.:

I claim, first, The concave bed, D, in combination with the adjustable cutter, E, arranged in connection with the bed-piece, A, substantially as and for the purpose herein set forth.

Second, The cutter, H, provided with the grooved cap plate, J, and fitted in the bed-piece, A, substantially as and for the purpose specified.

Third, Providing the bed-piece, A, with the longitudinal grooves, a a′, in combination with the two cutters, E H, provided respectively with the concave bed, D, and cap-plate, J, substantially as and for the purpose specified.

41,368.—Lathes for Turning Spokes.—Theophilus Derington, Du Quoin, Ill.:

I claim, first, Controlling the lateral motion of the cutters, and at the same time feeding them up to the work of making spokes by means of a single pattern, constructed and operating substantially as described.

Second, A spoke pattern constructed with a spiral or screw thread on its surface, substantially as and for the purposes described.

Third, The oscillating traveling carriage, H J, in combination with the travelling weight, I, tooth, n, and a spoke pattern operating substantially as described.

41,369.—Apparatus for addressing Newspapers, &c.—Wm. M. Doty, New York City :

I claim the employment of the oscillating feed levers, F, fingers, i, and curved bed, K, in combination with the gate, B, in the manner and for the purpose herein shown and described.

I also claim the combination of the spring, d, with the cutters, D E, and gate, B, in the manner herein shown and described.

[This invention consists in the arrangement of a rising and falling gate acted upon by a suitable handle and spring, and provided with a movable cutting jaw or blade in combination with a curved bed, stationary cutting blade end, and oscillating levers provided at the upper ends with cam slots fitting over pivots projecting from the ends of the rising and falling gate, and carrying at their other ends a rock-shaft provided with pointed fingers or dogs and acted upon by a spring or springs, in such a manner that on depressing the gate the pointed fingers or dogs are carried back, and on raising the gate the said fingers act on the paper and feed it at regular intervals to the cutting blades. Mr. Doty's address is 42 Park-row, New York City.]

41,370.—Spoke-socket and Felly Clamp.—L. D. Flanders, Cleveland, Ohio :

I claim the plate, C, socket, A, lugs, B B, and lips, a a, all cast in one piece and secured to the felloe by means of the screw, b b, substantially as and for the purpose specified.

41,371.—Plowing Machine.—D. D. Foley, Washington, D. C.:

I claim the share, B, in combination with the rollers, E E E′, and reversible platform, F, substantially as described, for the purpose of plowing up and inverting the surface of the earth with much less friction than is commonly experienced.

The share, B, and rollers, E, in combination with the revolving cutters, C, and colters, K3, or their equivalents for the purpose of more perfectly dividing sod ground.

The platform, F, in combination with latch springs, G, the geared wheels, H I and J, or their equivalents, for the purpose of rapidly inverting the sod, so that it will fall with certainty upside down, all substantially as described.

41,372.—Pepper Bottle.—J. W. Gay, Brooklyn, N. Y.:

I claim a pepper box or bottle formed with a contraction in the neck, of the nature and for the purposes specified.

41,373.—Carrying Cranks over Dead Points.—Francis Glass, of Knightstown, Ind.:

I claim the combination with the piston rod, D, and cross head, C, of the angular block or gate, F, controlled by a spring or cam, and employed to carry the wrist-pin, H, beyond the dead points in the manner explained.

[By this invention the dead centers of the crank are effectually overcome, and the engine caused to work smoothly in all parts of its stroke, and adapted to be started with equal freedom at any point.]

41,374.—Feed-water Heater for Steam Boilers.—A. M. Granger, of St. Louis, Mo.:

I claim, first, The basin, d, in combination with the immersed

mouth of the feed pipe, a, and the heating vessel, D, substantially as herein specified.

Second, The perforated basins, e, and f f, arranged within the heating vessel, D, to deliver the water in the form of a shower or spray, substantially as herein described.

Third, The protecting casing, h, applied in combination with the basins, d, e, f, f, as and for the purpose herein set forth.

[This invention consists in heeting the feed water on its way from the feed pump or other feeding apparatus, to the mud well or lower part of the boiler, by exposing it in the form of drops or spray, in direct contact with steam taken from the boiler, thereby causing a more speedy and perfect separation of the mineral matters and other impurities than is obtained by means at present in use. It also consists in certain devices for effectig the distribution of water in the best practicable manner within the heating vessel.]

41,375.—Repeating Fire-arm.—Joshua Gray, of Boston, Mass.:

I claim, first, The stationary curved rack, N, constructed and operating as described.

Second, The spring bar, O, for the purpose of carrying up the cartridge from the magazine to the barrel, substantially as described.

Third, The sliding carrier, L, in combination with the lever, J, and spring, O, or their equivalents, as and for the purpose described.

Fourth, The combination and arrangement of the rack, N, pinion, M, and sector, G, or their equivalents.

Fifth, The bent lever, J, arranged as set forth, and operating in combination with the sliding carrier, L, and start, g, on the sector, G, as and for the purpose described.

41,376.—Furnace for roasting Ores.—C. B. Grubb, of Lancaster, Pa.:

I claim the application of an elevated kiln, provided with side furnaces, a cooler opening into an archway, constructed substantially in the manner described for the purpose of roasting ore, as specified.

41,377.—Machine for binding Grain.—S. T. Holly, of Rockford, Ill.:

I claim the combination of a flexible compressing strap, with mechanism for extending it round the gavel to be bound, and drawing it taut with a variable force; the combination as a whole operating substantially as set forth.

I also claim the arrangement of the instrumentalities for applying the compressing strap in such manner that the latter is held out of the way of the grain while it is being moved to and from the place where it is bound, substantially as set forth.

I also claim the combination of a reciprocating arm fitted with fingers for carrying the binding cord with a reciprocating bar for operating it, substantially as set forth.

I also claim the combination of two reciprocating arms with fingers, to operate upon the binding cord, and with the same reciprocating bar, so that the two arms are caused to embrace opposite sides of the gavel to be bound, and apply the binding cord by the movement of the same bar, substantially as set forth.

I also claim the combination of a reciprocating arm with a hinged hand fitted with fingers to carry the binding cord, substantially as set forth.

I also claim the combination of a hinged hand fitted with fingers, with an inclined plane or other instrumentality to turn the hand on its wrist-pin, substantially as set forth.

I also claim the combination of two pairs of fingers (for holding the binding cord) and the mechanism for moving them in such manner that one pair will pass between the other pair when moving in one direction (relatively thereto), and outside the said other pair when moving in the opposite direction (relatively thereto), so as to deliver the cord held by the first pair to the second pair, the combination as a whole operating substantially as set forth.

I also claim the combination of a gathering arm with the same reciprocating bar that operates the arm (or arms) which carries the binding cord or the compressing strap in such manner that the said gathering arm completes its movement before the other arm does, substantially as set forth.

I also claim the combination of two reciprocating arms, fitted with fingers, to carry the binding cord with a cord-twister for twisting the ends of the band together, substantially as set forth.

I also claim the combination of fingers carrying the binding cord with a pin or stud across which the binding cord is strained, substantially as set forth.

I also claim the combination of fingers holding the binding cord, with an instrumentality for relaxing their hold on the cord, which is operated by the band-securing mechanism, substantially as set forth.

I also claim the combination of the instrumentalities for applying the binding material, or the compressing strap, to the gavel, with a locking mechanism for holding them fast until the binding is completed, the combination as a whole operating substantially as set forth.

I also claim the combination of the cord-twister (having jaws adapted to seize and hold cord) with a knife for cutting the cord, substantially as set forth.

I also claim the combination of the cord-twister with a fork, to operate upon the twisted ends of the band, the combination as a whole operating substantially as herein set forth.

I also claim the operation of the mechanism for operating the cord-twister, with stop mechanism for stopping its motion when it is in proper position for receiving the ends of the band, the combination as a whole operating substantially as set forth.

41,378.—Machine for binding Grain.—S. T. Holly, of Rockford, Ill.:

I claim the combination of instrumentalities or compressing and binding grain with a funnel-mouthed cradle, substantially as set forth.

I also claim the combination of a flexible compressing strap with a tension apparatus therefor and with a ring carrier, the combination as a whole operating substantially as set forth.

I also claim the combination of a flexible compressing strap and apparatus for withdrawing it from the sheaf, with a detachable strap-holder, the combination as a whole operating substantially as set forth.

I also claim the combination of fingers or other instrumentality to hold the binding material, with a ring carrier to carry it around the position of the gavel to be bound, substantially as set forth.

I also claim the combination of cord-feeding fingers, with an oscillating finger-stock, substantially as set forth.

I also claim the combination of traveling cord fingers and mechanism to carry them around the position of the gavel to be bound, with a stop by means of which they are opened to release the cord at the proper time, the combination as a whole operating substantially as set forth.

I also claim the combination of a knife blade with the oscillating finger-stock, substantially as set forth.

I also claim the combination of a carrier arranged to turn in one direction around the position of the gavel, with a locking mechanism, the combination as a whole operating substantially as set forth.

I also claim the combination of instrumentalities for surrounding the gavel with cord, with a cord-twister and shield, the combination as a whole operating substantially as set forth.

I also claim the combination of the stop which stops the movement of the ring carrier for encircling the gavel with cord, with detent mechanism that permits the operation of the cord-securing devices when the gavel is encircled with cord, the combination as a whole operating substantially as herein set forth.

I also claim the combination of a detachable holder for the compressing-strap, with the mechanism for securing the ends of the band so that the strap is released when the band is secured, the combination as a whole operating substantially as herein set forth.

41,379.—Reversible Latch Bolt.—B. G. Hosmer, of Nashau, N. H.:

I claim, first, Connecting the latch bolt, D, to the tumbler fork, C, by means of the hinged or swinging hook, E, substantially as and for the purposes set forth.

Second, The combination of the peculiarly constructed tumbler fork, C, and the peculiarly constructed latch bolt, C, with the parts connected therewith, as and for the purposes set forth.

41,380.—Method of securing Tubes in Steam Boilers, &c. James Howell and David Birdsall, of Jersey City, N. J.:

We claim, first, the combination of the enlargements at one end of the tubes, and corresponding enlarged holes in one tube sheet, substantially as herein specified.

Second, The internally and externally tapered screwed thimbles, D, applied in combination with the taper screw threads, e, on the tubes, and taper-tapped holes, g, in the tube sheet, B, substantially as herein described.

41,381.—Knitting Machinery.—Luke Kavanaugh, of Waterford, N. Y.:

I claim the combination of the stud or spindle, B, secured in the stock or hub of the burr, and the socket bearing, C, supplied with oil from the bottom by a reservoir, E, or other means, substantially as herein specified.

[This invention relates to the rotary burrs used in knitting machines, both as sinkers and for landing and casting off the loops. The stock or hub of the burr has heretofore been made with a hole in the center and fitted to rotate on a fixed stud, and has not only required a very frequent application of oil for lubrication, but the oil, having been applied above, has run over the exterior of the burr and injured the work. The invention consists in securing the hub or stock of the burr to the stud and fitting the latter to a socket bearing, lubricated from below by a fountain or other receptacle for the oil.]

41,382.—Ladies Skirt-lifter.—Rufus Leavitt, of Melrose, Mass.:

I claim making the skirt with a series of eyes attached at or near the belt, and another series at a suitable distance below the same, and interlacing them by a cord, substantially in the manner and for the purpose described.

41,383.—Reaping Machine.—J. B. McCormick, of St. Louis, Mo.:

I claim the automatic rake, G, arranged to operate so as to discharge the grain at one side of the rear of the platform, B, in combination with the table, I, and binder's platform or stand, J, all arranged substantially as herein set forth.

[This invention consists in the employment or use of an automatic rake arranged to operate in such a manner as to deliver the grain at one side of the rear of the machine, in combination with a gavel receiving table and a binder's platform or stand.]

41,384.—Harvester.—John C. McDougal, Black Rock, N. Y. Ante-dated Jan. 11, 1864 :

I claim the shoe, C', provided with the series of vertical notches, v, and the vertical oblong slot, s, in combination with the projections, w, at the outer side of the finger, u, all the parts being arranged as shown, to admit of the adjustment of the shoe, C', as set forth.

[This invention relates to an improved arrangement of the sickle, driving mechanism, whereby the same is fully protected from the cut grass and grain, and also from dust and dirt, and also readily thrown in and out of gear with the driving wheel, The invention also relates to an employment and arrangement of certain parts, whereby the machine may be readily converted from a grain to a grass harvester and *vice versa*.]

41,385.—Cork Extractor.—J. P. Miers and John Groendyke, Lebanon, N. J. :

We claim, first, The hand lever, F, in combination with the corkscrew, D, attached to the vertically sliding rotary spring shaft, C, in the manner and for the purpose substantially as shown and described.

Second, The vertically sliding carriage, B, in combination with the shaft, C, corkscrew, D, and hand lever, F, constructed and operating in the manner and for the purpose substantially as set forth.

Third, The cutting blades, E, applied in combination with the corkscrew, D, substantially as and for the purpose specified.

[This invention consists in a corkscrew attached to a vertically sliding rotary shaft which is exposed to the action of a spring or its equivalent, in combination with a hand lever, in such a manner that by the action of the spring or its equivalent on the shaft, the corkscrew is forced up against the cork and caused to enter the same, when the shaft is rotated, and after the corkscrew has been screwed in the cork, a slight pressure or tap of the hand on the hand lever causes the same to be drawn out of the bottle with the greatest ease and facility.]

41,386.—Street Car.—J. A. Miller, New York City :

I claim, first, The combined arrangement of a momentum-saving friction brake, substantially such as herein described, with the hand wheel and shaft, which serves to operate the ordinary brake, and with a treadle, d, sliding clutch, c, and drum, b, or their equivalents, all constructed and operating in the manner and for the purpose substantially as set forth.

Second, The arrangement of the ring, H, with springs, I, in combination with the sliding disk, G, and axle, C', of a street car, constructed and operating in the manner and for the purpose substantially as herein shown and described.

[This invention consists in the arrangement of a momentum-saving friction brake in combination with the hand wheel and shaft, which serves to operate the ordinary brake and with a treadle and sliding clutch, in such a manner that by the act of turning the hand-wheel, whereby the ordinary brake is applied, the momentum-saving brake is also brought in operation, and by stepping on the treadle the ordinary brake is taken off and the momentum-saving brake assists in starting the car. Mr. Miller's address is 200 Broadway, New York.]

41,387.—Caliper.—W. A. Morse, Boston, Mass.:

I claim the projecting ends or arms, F F', passing each other as specified, in combination with the double scale, A A', for the purpose herein shown and described.

41,388.—Ice-crusher.—Lucilius H. Moseley, Poughkeepsie, N. Y.:

I claim, first, The bisecting cutter, F, and crushers, H, for the purposes set forth, in combination with the axis, E.

Second, I also claim the use of the pins or studs, I, arranged as hereinbefore described, on the cheeks or sides of the box, A, in combination with the bisecting cutter, F, and crushers, H, substantially as set forth.

Third, I also claim the use of an ice-crusher case or box, A, when it has a mouth, B, in the top of it for the reception of the lump of ice, and a vent, c, in the bottom of it for the discharge of the crushed ice, in combination with the bisecting cutter, F, and crushers, H, for the purposes hereinbefore set forth.

41,389.—Cultivator.—Wm. H. Older, Packwaukee, Wis. Ante-dated Jan. 20, 1864 :

I claim the arrangement of the standards, F F, and treadles, K K' M, as shown and described, to wit, the standards being fitted in the bar, E, with the bolts, d, passing through longitudinal oblong slots, e, therein, and the treadles connected to the standards by means of the cords, belts or chains, f f' f'', all arranged to operate as set forth.

[This invention relates to an improved cultivator of that class which are designed for cultivating corn. The object of the invention is to obtain a cultivator of the class specified, which will have its plows under the complete control of the driver, so that they can be raised or lowered or adjusted laterally, and operated solely by the feet.]

41,390.—Band-cutting and Feeding Attachment to Thrashers.—Isaac H. Palmer, Lodi, Wis.:

I claim a band-cutter and feeder for thrashing machines, constructed and operating substantially as herein described.

[By means of this invention the bands are severed and the sheaves opened out and fed to the thrashing machine with great rapidity and as effectually as it can be done by hand.]

41,391.—Calendar.—James M. Patton, Indianapolis, Ind.:

I claim as a new article of manufacture, the calendar herein described, when arranged and operated substantially as and for the purposes set forth.

41,392.—Preserving Fruit in Jars, &c.—S. J. Parker, Ithaca, N. Y.:

First, I claim the prevention of mold in fruit jars, by any apparatus by which a liquid or fluid is let in and to fill completely the inside of the jar, as it cools.

Second, I claim a total or partial filling of the cavity always formed by the cooling of the contents of a fruit jar, by gases or vapors of easily volatile and expansive fluids, when the said gases or liquids are contained in any suitable cavity or apparatus as described.

Third, I claim as a new device in fruit jars, the special oval opening of the lip above the mouth or neck of the jar and the side crescent-shaped inverted edges of the same, in combination with an oval-shaped stopper.

41,393.—Sewing-machine Case.—Alexander Pilbeam, South Kensington, England :

I claim the arrangement and construction of the stands or supports of sewing machines, so as to fold or collapse into the form of a chest or case, small and compact in compass, inclosing all parts of the machinery within it, suitable for the purpose of transit and traveling, substantially as hereinbefore described, or any mere modification thereof.

41,394.—Finishing the Soles of Boots and Shoes.—James Purinton, Jr., Lynn, Mass. :

I claim a boot or shoe having the stitching, pegging or nailing, in the sole or heel, concealed by the use of paper or other material attached and covering partially or entirely the outer surface, as herein described and specified.

41,395.—Apparatus for feeding Paper to Envelope Machines.—George H. Reay, New York City :

I claim the employment of the hook, C, or its equivalent, in combination with the pickers, B, or their equivalent, substantially as and for the purpose shown and described.

[This invention consists in the employment of a hook or finger in combination with the ordinary lifters or pickers of an envelope machine, or with any other equivalent device, serving to raise or deliver the blanks or sheets of paper in such a manner that, by the action of said hook or finger that portion of the sheet between or close by the lifters or pickers is slightly turned down as soon as the pickers ascend, and any sheet adhering to that sheet which is in contact with the pickers are separated, and the feeding of the blanks or sheets, one at a time, is carried on regularly, thus avoiding the waste caused by the adhesion of the blanks to each other and the consequent simultaneous introduction of two or more sheets to the folding mechanism.]

41,396.—Trying Square.—John Richards, Columbus, Ohio :

I claim, first, A trying square constructed with a movable blade or its equivalent, substantially as and for the purposes described.

Second, Applying a spring or its equivalent, to the movable-blade trying square, for the purpose of keeping said blade in a proper position for use, substantially as described.

Third, Registering or indicating angles by means of the blade and head, or some portion thereof, of a trying square, substantially as described.

41,397.—Sawing Machine.—F. J. Richmond, Ashford, Conn.:

I claim the arrangement of the swinging bars, L L, slides, I I, crank shaft, D, shaft, N, arms, O O, segments, M, and saws, J, in combination with the curved jaw, S, attached lever, R, buck, e e, pivoted notched bar, T, and plate, U, all as herein shown and described.

[This invention relates to a new and improved cross-cut sawing machine for sawing fire-wood, &c. The invention consists in the employment of reciprocating saws arranged in connection with swinging guide bars and a novel means for adjusting the latter, and also arranged with a log-clamping device, whereby it is believed that a very superior, simple and efficient device is obtained for the purpose specified.]

41,398.—Manufacture of Sugar and Sirup from Sorghum, &c., J. F. Riggs, Fremont, Nebraska :

I claim, first, Applying soda or other suitable alkali to the sirup, while the latter is at a temperature of 100° Fah., or thereabouts, for the purpose of rectifying the same, as explained.

Second, Refining sorghum or other sugar by the applying of water or other suitable liquid thereto, and quickly pressing out, substantially as and for the purposes explained.

[This process has produced sugar of the finest quality from sorghum sirup, in no respect distinguishable from that made from the sugar cane.]

41,399.—Skate Fastening.—G. P. Schiffin, New York City :

I claim the employment or use of the cam-buttons, c, attached to the runner, B, of a skate and acting on the straps, C, in the manner and for the purpose substantially as herein shown and described.

41,400.—Manufacture of Soap.—S. A. Sealy, Brooklyn, N. Y.:

I claim mixing the grease used in the manufacture of soap with a quantity of vegetable flour, about in the proportion herein specified, previous to adding the alkali, as described, so that by the flour the grease is spread or opened and all its particles are caused to come in immediate contact with the alkali. Also the within-described composition of the ingredients above specified and mixed together in the proportion and in the manner set forth.

41,401.—Manufacture of Tinned Lead Pipe.—W. A. Shaw and Gardner Willard, New York City :

We claim forming an ingot of metal for lining lead pipe with a taper at one end or an enlargement at the other, or both, for the purposes and as specified.

41,402.—Submarine Gun.—Joseph N. Smith, New York City. Ante-dated Jan. 4, 1864 :

I claim the breech-piece, B, when pivoted above the central line of the bore of the gun, and provided with a packing block centered below the said central line of the bore, substantially as and for the purpose herein specified.

I also claim the self-adjusting packing block, C, pivoted transversely in the breech-piece, in combination with said breech-piece, substantially as and for the purpose herein set forth.

I also claim disabling the gun by means of the removable pivot pin, b, which pivots the packing block to the breech-piece, as specified.

I also claim a cut-off, H, for closing the muzzle of the gun against the influx of water into the barrel after the discharge of the projectile therefrom

41,403.—Punching Press.—N. C. Stiles, West Meriden, Conn.:

I claim, first, The compound eccentric, D, consisting of an eccentric wrist-pin, a, adjustable disk, b, and clamp, d, or its equivalent, in combination with the pitman, F, constructed and operating in the manner and for the purpose substantially as set forth.

Second, The V-shaped faces, g, on the slide, E, in combination with the jaws, G, cast-on or with the stock, A, and with the triangular gib, h, all as and for the purpose specified.

Third, The touch-off device, k H, arranged in combination with the clutch pin, m, substantially as shown and described, so that said clutch pin is thrown in either direction by the direct action of the cam.

Fourth, The loose clutch pin, m, applied in combination with the band wheel, C, and shaft, B, in the manner and for the purpose substantially as specified.

Fifth, The button, l', on the shaft, B, in combination with the spring catch, k', clutch pin, m and n, and cam, H, arranged substantially as described so that the cam is released automatically after the punch or cutter has completed its stroke.

Sixth, The yielding coupling pin, n, in combination with the clutch pin, m, and touch-off device, k H, constructed and operating in the manner and for the purpose substantially as specified.

Seventh, The yielding fulcrum pin, J, arranged in combination with the cam, H, clutch pin, m, and band wheel, C, substantially as and for the purpose set forth.

41,404.—Spring for Wheel Vehicles.—John E. Tuber, Fall River, Mass.:

I claim the springs, E, fitted on the rods, D, and connected thereto and the frame, B, in connection with the tubes, G H, collars, F I, all arranged substantially as and for the purposh herein set forth.

I further claim the connecting of the springs, E, to the frame, B, by means of the bars, J, collars, I, and joints, e d, when used for the purpose herein specified.

[This invention consists in the employment of spiral springs applied to a wheel vehicle, in such a manner that the body of the latter will have a yielding movement in any direction, that is to say, both forward and backward, laterally and vertically, and a very easy and comfortable pleasure vehicle obtained and one which will not be liable to be racked or injured by jars or concussions in passing over rough or uneven roads, the springs also not being liable to be injured by being subjected to heavy loads.]

41,405.—Machine Belting.—Henry Taylor, Trenton, N.J.:
I claim the new article of manufactured, belting constructed substantially as above described and set forth.

41,406.—Motive Power.—Jose Toll, Locust Grove, Ohio. Ante-dated Jan. 24, 1864 :
I claim the arrangement of the doubly-cogged master wheel, E, meshing with the disconnected pinions I, I I and I I I, coincident with the lines of contact of a series of crushing or other rods, 1 2 3, the whole being combined and operating together in the manner and for the objects stated.

41,407.—Plow.—James Tomlinson, Racine, Wis.:
I claim a plow having its mold-board, share, and coulter, in the form of a scoop or spiral shell and provided with a curved land side, F, substantially as set forth.

[This invention consists in constructing the mealboard, share, and coulter, all in one piece and of scoop or hollow screw form with a point nearly in the center of the cutting part or share, whereby the furrow slice is cut rounding on the land side and turned over with far greater facility than by the plows of ordinary construction, the draught of the plow rendered comparatively light and the furrow slice in being turned not elevated as high as when turned by the ordinary plows, the invention at the same time being better adapted for a gang plow than those of ordinary construction. The invention furrther consists in a novel arrangement of a wheel and lever applied to the plow frame or beams in such a manner as to gage the depth of the plow or plows, and enable the latter to be raised out of the ground by the plowman with the greatest facility.]

41,408.—Boiler Feeder.—George I. Washburn, Worcester, Mass.:
I claim, first, Condensing a body of steam within an apparatus having no external outlet by forcing it from one chamber to another by the gravity of water, and causing it to pass beneath the surface of and in contact with the water in the chamber into which it is forced, substantially as herein described.
Second, In a condensing or pumping apparatus operating substantially on the principle specified, I claim the use of a check valve, c, operating as described, to prevent the reflux of water into or down the supply pipe.
Third, The combination of the hollow divided shaft, D, chambers, A1 A2 E1 E2, and valve, G, operating substantially as and for the purposes set forth.
Fourth, The combination of the rod, H, with the oscillating shaft, D, and valve, G, for imparting motion to the said valve as explained.
Fifth, The chambers, A1 A2 and C, and troughs, B1 B2, operating together in manner substantially as and for the purposes set forth.

41,409.—Railroad Car.—James Withycombe & Charles Reiblein, Cleveland, Ohio :
I claim supporting the bolsters, F F', of railroad cars, by the beams, C C C' C', and E E', arranged and operating as and for the purpose set forth.

41,410.—Water Elevator.—James C. Barrett, Stamford, Conn., assignor to Joseph R. Van Marter, Lyons, N. Y.:
I claim the pulley, G, attached to the shaft, B, of the windlass, in connection with the disk, I, placed loosely on the shaft, B, the clamps, H H', and crank, J, all arranged to operate substantially as and for the purpose specified.
I further claim the eccentric, h, and the friction roller, g, or an equivalent bearing; when used in combination with the disk, I, and applied to a windlass to operate as and for the purpose set forth.

[This invention relates to certain improvements in windlasses for raising light weights, designed more especially for raising water from wells in buckets. The object of the invention is to obtain a windlass of simple construction which will admit of the bucket being lowered by its own gravity by a very simple manipulation of the crank and without having the latter turned with the drum of the windlass as the bucket descends, the filled bucket at the same time being held at any desired point when the crank is free from the hand of the operator.]

41,411.—Harvester.—Henry Fisher, Alliance, Ohio, assignor to himself, Wm. M. Whitely, Jerome Fassler & Oliver S. Kelly, Springfield, Ohio :
I claim in combination with the stationary bowl or cam, M, arranged as described, extending the rake-head back behind its fulcrum so as to raise and control the rotating rake by the action of the camway on its heel or rear end, substantially as described.
In combination with the rake, I claim the curved arm on the side of the rake to push the grain down in advance of the rake and insure its being cut before the rake shall move it on the platform.

41,412.—Cast-iron Pavement and Gutter.—Morton Pennock (assignor to himself & Samuel Pennock), Kennetts Square, Pa.:
I claim, first, The channel, B, under the metal plates, A, substantially as and for the purpose described.
Second, The combination with the plates, A, of a gutter, C, of metal with a channel, D, substantially in the manner and for the purpose set forth.
Third, The gutter, C, made of metal or other good conductor of heat and provided with a channel, D, substantially as and for the purpose specified.

[This invention consists in arranging a hollow space or channel under the metal plates which constitute the pavement in such a manner that by admitting steam or heated air into said channel, the pavement can be kept free from snow and ice; and it also consists in the arrangement of a metal gutter with a similar channel in combination with the pavement in such a manner that by admitting steam or heated air under said gutter the same can be freed from ice and snow and at the same time the water accumulating in it prevented from freezing.]

41,413.—Casting Packing-rings in Gas and Water Pipes.—Richard C. Robbins (assignor to himself, Henry L. Case, Jesse M. Keen & John W. Mason), New York City :
I claim, first, The forming ring, B, constructed as described, for the purpose set forth.
Second, The combination therewith of setscrews arranged as described to secure it in place.
Third, The combination with the said forming ring, B, of the india rubber ring, G, substantially as described and for the purpose set forth.

41,414.—Frame for Traveling Bags.—Zachariah Walsh assignor to Cornelius Walsh), Newark, N. J.:
I claim the combination of the divided lip, d d, and jointed frame, B, constructed and arranged as and for the purpose herein shown and described.

[This invention consists in constructing each side of the frame of the bag with one or more joints in such a manner that the sides of the frame may be distended or forced apart in order to open the bag, thereby avoiding the curved ends of the ordinary frames which, unless side locks or straps are used, admit of the hand being inserted within the bag at each end when the frame is locked.]

41,415.—Take-up for Circular Knitting Machines.—Samuel Ward, Amsterdam, N. Y., assignor to George Campbell & John Clute, Cohoes, N. Y.:
I claim, first, The arrangement of the take-up rolls in a frame, C c, which is arranged to swing within the rotating frame, A a, under the control of spring, g, and levers, I, or their equivalents, substantially as and for the purpose herein specified.
Second, The pawl, k, and stop lever, g, applied in combination with each other and with the ratchet wheel, f, frames, C c, and A a, and stationary cam, E, to operate substantially as and for the purpose herein set forth.

[This invention relates to the take-up of that class of circular knitting machines in which the needle-plate or needle-ring has a rotary motion about its axis; and it consists in certain means of controlling the operation of such a take-up, by the tension of the knitted goods, whereby all parts of a piece of goods are made uniformly of any desired texture or tightness.]

41,416.—Machine for cutting Hay for Pressing.—Orson Waste & Charles Waste (assignors to Charles Waste), Cameron, Ill.:
We claim, first, The combination of the rollers, A A, with a knife working periodically, so connected and geared to the rollers as to cut the hay in proper lengths for packing, substantially as set forth.
Second, We claim the combination and arrangement of the catch, F, with the weight, E, and knife, C, substantially as and for the purpose specified.
Third, We claim also the combination of the knife, C, with a grooved projection, M, substantially as set forth.

41,417.—Fruit Can.—Joseph B. Wilson (assignor to David W. Moore), Fisherville, N. J.:
I claim the stopper, D, composed of the guiding portion, f, flange, e, and projection, d, when combined with and arranged in respect to the mouth of a vessel having two shoulders, a and b, in the manner set forth.

REISSUES.

1,609.—Machine for enameling Picture Frames.—O. L. Gardner (assignee of John Sperry & C. W. Sherwood), New York City. Patented April 2, 1861 :
I claim, first, The employment for the purpose specified, of a basin or enamel receiver, D', either fixed or stationary, used in connection with a rotating shaft, C, or an equivalent means, for rotating the frame, I, to be enamelled, and either with or without a lamp, E, or other heating medium, substantially as described.
Second, The scraper, J, formed of two plates, g, h, connected together by a bolt, j, and arranged to operate as and for the purpose hereinset forth.
Third, The lever, H, in combination with the pin, e, of shaft, C, and the pin, f, of the sliding or adjustable basin or receiver, D', or other suitable clutch, arranged to operate substantially as and for the purpose specified.

1,610.—Machine for cutting-out Boot and Shoe Soles.—David Knox & Walter D. Richards (assignees by mesne-assignments of C. H. 'Griffin), Lynn, Mass. Patented June 12, 1855 :
I claim, first, The combination of the depresser bar with the reciprocating knife frame, its two movable knives and their elevating springs or equivalent machinery, such being arranged and made to operate together substantially as specified.
Second, I claim in constructing a machine with two knives, each connected to a separate cutter-head, and with their edges toward the surface to be cut that by the mechanism employed said knives shall be brought alternately to the cutting point, the one ascending as the other descends, the one cutting the right and the other the left side of the sole, and so on alternately in the manner described, and for the purposes set forth.

DESIGNS.

1,888.—Hand Engine.—Wm. R. Bush, Fall River, Mass.:

1,889.—Trade-mark.—Samuel B. Newell, Cincinnati, Ohio :

1,890.—Oil-cloth Pattern.—Joseph Robley, Brooklyn, N. Y.

1,891 and 1,892.—Valves.—W. Barnet Le Van, Philadelphia, Pa. (2 cases):

1,893.—Stove Plate.—Nicholas S. Vedder & Benjamin F. Johnson (assignors to Wager & Fales), Troy, N. Y.:

EXTENSIONS.

Steam Boiler Furnace.—Benjamin Crawford, Allegheny, Pa. Patented Jan. 29, 1850. Re-issued Dec. 2, 1862:
I claim, first, The injection of whirling jets of steam among the gases evolved by the fuel on the grates, for the purpose set forth.
Second, Self-whirling adjustages or their equivalents on the pipes leading from the boiler or steam blower to proper positions for increasing the draught or promoting combustion, substantially as set forth.
Third, Whirling live steam for the purpose of increasing or maintaining the draught of a steam boiler furnace, substantially as set forth or the equivalent thereto.
Fourth, A combined stream of mingled steam and hot air introduced and forced into the ash-pit and up through the fire of a steam boiler furnace by means of the steam boiler, and hot air and steam pipes which intersect one another and terminate in a discharging nozzle within the ash-pit, substantially as set forth or the equivalent thereto.
Fifth, Live steam blowers arranged in the flues of a steam boiler for the purpose of aiding the draught and blowing out the foul matter which accumulates in the flues.
Sixth, The combination of means as set forth for performing unitedly the several functions specified.

Spark-arrester.—James Radley & Margaret Hunter (administratrix of John W. Hunter, deceased), New York City. Patented Jan. 22, 1850. Re-issued Jan. 16, 1855 :
We claim, first, The arranging of a series of chambers and channels between conically shaped plates, the channels being so formed as to cause the products of combustion to impinge against that side of each of the dirt chambers, which has the springs and caps, and thereby force the sparks, dirt, &c., into them in the manner described herein.
Second, We claim the piece, p, suspended in the central aperture at the top of the spark-arrester, arranged and operating in the manner and for the purpose substantially as herein before described.
Third, We claim the double cover or top for the formation of a second series of dirt passages, arranged and operating in the manner and for the purpose substantially as hereinbefore described.

Loom for Piled Fabrics.—John Turnbull, Baltimore, Md., and James Turnbull, Simsbury, Conn. Patented Jan. 29, 1850 :
We claim, first, Dividing the heddles into two or more divisions to be worked in succession, substantially as herein described, that the entire opening of the shed may be effected in succession, and thus avoid the evil effects consequent on the opening of the shed, at one operation as heretofore described.
Second, Operating the two picker levers or treadles by means of a shifting tappet operated or shifted alternately for each pick by means of an eccentric or its equivalent, that the shaft which carries the tappet or tappets may make one entire rotation for each throw of the shuttle, substantially as herein described, and thus operating the shuttle by a tappet rotating with greater velocity than by any means heretofore known, as described.

Binding the "Scientific American."

It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for references. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York.

The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the Rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds.

Back Numbers and Volumes of the "Scientific American."

VOLUMES I., III., IV., V., VII. VIII. AND IX., (NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, $2 25 per volume, by mail, $3—which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding. VOL. II. and VI. are out of print and cannot be supplied.

Notes and Queries

W. P., of Md.—Tallow and grease oils containing poisonous oxides have been applied to the bottom of iron ships to prevent them from rusting and the attacks of barnacles, but such a composition rubs off so easily that it is of very little use.

R. Y. W., of Conn.—Chilled iron turning tools are sometimes used for very hard thin pulleys, but, unless the chill is continued down through the surface to some distance, they do not last long.

J. H. R., of Mass.—Packing rings cannot be turned with accuracy after they have been cut off from the main ring. We do not know of any chuck that will hold them. A block of wood, with a groove turned in it, is the best thing you can use if you are obliged to re-turn your packing.

P. McN., of Pa.—Pulleys for belts are made high in the center of the face, so that the belt will run true as it is the tendency of a belt to find the highest point on the pulley. We thought every mechanic knew this.

J. L. P., of C. W.—You say you like our article on a certain subject very well, but see one or two places where it might be made clearer. No doubt! We have seen a great many persons who could edit a newspaper far better (in their own opinion) than the editor himself.

H. R. S., of N. Y.—Cast iron may be brazed to wrought iron very easily. We do not know of any cement as strong as iron itself

F. R. S., of Wis.—You will find two very good Jonval wheels, suited for your fall of eight feet, illustrated on pages 164 and 273, Vols. III. (new series) of the SCIENTIFIC AMERICAN.

M. B., of N. Y.—From a given weight of hydrogen gas under combustion, a greater quantity of steam can be generated than from an equal weight of any other known combustible. A pound of pure carbon will evaporate 12¼ pounds of water and convert it into steam of 15 pounds pressure on the square inch. One pound of good Pennsylvania anthracite is capable of raising 9¼ pounds of water at 212° Fah. into steam.

J. B. C., of Conn.—Address H. C. Baird, Philadelphia, Pa., for a work on tinning, &c.

H. T., of Pa.—Superheated or dry steam was applied to the refining of iron twenty-four years ago, a patent for its use having been taken out in 1840, by Guest & Evans, in England.

G. H. M., of N. Y.—Admiral Foote was a naval officer, and as such commanded the gunboats at the attack on Fort Donelson. He co-operated with the military force under Gen. Grant, but reported to the Navy Department.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, Jan. 27, 1864, to Wednesday, Feb. 3, 1864 :—

A. T., of N. Y., $25; A. P., of N. Y., $25; G. S., of N. Y., $10; C. D., of N. Y., $25; I. S., of N. Y., $25; J. D., of N. Y., $25; I. N., of N. Y., $20; P. C., of N. Y., $20; A. A. B., of N. Y., $20; P. F. C., of Pa., $20; E. M., of N. J., $32; W. J. F., Jr., of N. Y., $20; G. W. L., of Ohio, $48; W. & W., of N. J., $25; E. C., of Conn., $10; A. Van B., of N. Y., $16; C. H. H., of Mich., $20; C. & O., of N. Y., $16; L. S., of N. Y., $41; S. N. T., of Wis., $20; W. F., of Iowa, $45; G. W. P., of N. Y., $20; W. B., of Pa., $45; G. W. G., of N. Y., $30; G. M., of England, $20; R. & C., of N. Y., $16; W. N., of N. Y., $16; L. H. W., of Mass., $10; A. W. H., of Ill., $20; A. L. S., of Conn., $30; L. W. F., of Iowa, $20; A. G., of N. Y., $16; J. T., of N. Y., $16; R. H. F., of N. Y., $10; S. G. R., of N. Y., $41; R. D., of Pa., $30; D. E. C., of N. Y., $20; H. & S., of Ill., $30; H. W. C., of Vt., $16; C. B., of N. Y., $16; L. H., of N. Y., $16; G. A. M., of N. Y., $41; W. M., of Ohio, $20; C. M. M., of N. J., $25; I. C., of Mo., $15; S. & G., of Mich., $25; W. J. W., Jr., of Ill., $16; J. B., of N. Y., $5; A. M. C., of Conn., $25; H. & R., of Pa., $10; R. F., of Ind., $20; J. F., of Ill., $25; W. G., of Ohio, $25; J. W. Jr., of Wis., $25; J. N. H., of Ill., $15; F. & H., of Pa., $15; J. T., of Wis., $25; G. E. W., of R. I., $25; J. N. S., of Ill., $16; S. D. E., of Pa., $25; K. & E., of Iowa, $25; A. S., of Iowa, $25; L. S. F., of N. J., $41; A. B. G., of Ill., $16; S. & L., of Iowa, $16; J. W., of Mass., $16; W. C. H., of Ill., $16; H. W. B., of Iowa, $25; W. & J., of Mich., $27; G. G. T., of Madeira, $100; I. C. C., of Ohio, $25; K. P. K., of Vt., $16; B. McD., of Ky., $25; J. W. D., of Mich., $25; B. & A., of Cal., $20; W. C., of Wis., $20; T. & S., of Wis., $25; F. J. N., of Mo., $16; T. D R., of N. Y., $16; W. W., of Cal., $15; C. D. H., of C. T., $22; D. E., of Ill., $16; G. C., of Mich., $16; F. M. M., of Ind., $22; L. R., of N. Y., $12; C. J. F., of N. J., $25; G. A. E., of Mass., $21; C. R., of Pa. $43; C. T. B., of N. J., $25; R. & Co., of N. Y., $25; S. N. T., of Wis., $20; W. E. R., of Iowa, $25; J. H. F., of Ill., $16; B. & W., of Pa., $16; N. S. T., of Pa., $16; R. H. R., of N. Y., $25.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, Jan. 27, 1864, to Wednesday Feb. 3, 1864 :—A. T., of N. Y.; A. P., of N. Y.; G. S., of N. Y.; G. M., of Conn.; C., D., of N. Y.; I. S., of N. Y.; J. D., of N. Y.; L. S., of N. Y.; K. & E., of Iowa; T. & S., of Wis.; A. S., of Iowa; A. L., of Iowa; A. M. C., of Conn.; J. W. D., of Mich.; G. E. W., of R. I.; I. C. C., of Ohio; G. M. McD., of Ky.; W. C., of Wis.; J. B., of N. Y.; J. P., of Ill.; W. G., of Ohio; J. W. J., of Wis.; D. W., of Ill.; W. M., of Ohio; S. & G., of Mich.; G. T., of Madeira; S. D. E., of Pa.; C. D. H., of C. T.; W. & J. of Mich.; P. C., of Mass.; C. M. M., of N. J.; C. F., of Ill. (2 cases); G. A. E., of Mass.; I. C., of Mo; J. T., of Wis.; C. J. F., of N. J.; C. R., of Ky.; L. S. F., of N. J.; R. & C., of N. Y.; C. T. B., of N. J.; R. T. S., of N. Y.; L. R., of N. Y.; W. E. R., of Iowa; S. H. M., of Ill.; R. H. R., of N. Y.

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

A VALUABLE WORK FOR INVENTORS PATENTEES AND MANUFACTURERS.

The publishers of the SCIENTIFIC AMERICAN have just prepared, with much care, a pamphlet of information about Patents and the Patent Laws, which ought to be in the hands of every inventor and patentee, and also of manufacturers who use patented inventions. The character of this useful work will be better understood after reading the following synopsis of its contents :—

The complete Patent Law Amendment Act of 1861—Practical Instructions to Inventors, how to obtain Letters Patent, also about Models—Designs—Caveats—Trade-marks—Assignments—Revenue Tax —Extensions—Interferences—Infringements—Appeals—Re-Issues of Defective Patents—Validity of Patents—Abandonment of Inventions —Best Mode of Introducing them——Importance of the Specification —Who are entitled to Patents—What will prevent the granting of a Patent—Patents in Canada and European Patents—Schedule of Patent Fees ; also a variety of miscellaneous items on patent law questions.

It has been the design of the publishers to not only furnish, in convenient form for preservation, a synopsis of the PATENT LAW and PRACTICE, but to answer a great variety of questions which have been put to them from time to time during their practice of upwards of *seventeen years*, which replies are not accessible in any other form. The publishers will promptly forward the pamphlet by mail, on receipt of six cents in postage stamps.

Address MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, No. 37 Park Row, New York.

STATE AND COUNTY RIGHTS FOR SALE FOR ONE of the best improved washing machines that are now before the public, patented Aug. 13, 1862, by Melchor Mellinger, of Dayton, Ohio. This machine is simple in its construction. Address M. MELLINGER, Dayton, Ohio. 1*

JAMES HORNER & CO., MANUFACTURERS OF CAST Steel and Files. Orders solicited for all kinds, shapes and sizes. Office and Warehouse, 28 Cliff street, New York. 7 6m

---

SELF-REGISTERING CALIPERS.—GIVING THE sizes without recourse to a rule. See engraving in SCIENTIFIC AMERICAN, of Aug. 8, 1863; 1½-inch (pocket) size, at 75 cents; 2-inch size (with set screw attached to indicator), $1 25. Now ready and will be delivered free of expense to purchasers on receipt of the price. A limited number of the 3-inch sizes are in process to supply demand only. Early orders will secure them. Larger sizes will be made if sufficient orders are received. Send for illustrated circulars. Liberal discount to the trade. Reliable agents wanted for all parts of the United States. KIMBALL & TALBOT, Worcester, Mass. 7 8*

WANTED.—A CRANE TO LIFT 5 TUNS, SUITABLE for General Foundry Purposes. Apply at 112, 114 and 116 Cannon street, New York. 1*

MILLER'S ELECTRICITY AND MAGNETISM—1. Magnetism; 2. Static Electricity; 3. Galvanic Electricity; 4. Electro-Magnetism; 5. Magneto-Electricity; 6. Thermo-Electricity; 7. Animal Electricity; 8. Relations of Light and Magnetism. By WM. A. MILLER, from 3d London Edition, 1 vol. 8vo. cloth, $2.50. Just Published by JOHN WILEY, 535 Broadway, New York. 7 3

PATENT IMPROVED SOLID EMERY WHEELS, FOR Cutting, Grinding, and Polishing. No Metal-worker can afford to be without them. Orders promptly filled. Smyrna Emery by the Keg, warranted Pure, and Best Quality. NEW YORK EMERY WHEEL COMPANY, 51 Beekman street, New York. 7 2*

18-INCH PIPE FOR SALE.—WE HAVE ON HAND about 4,200 feet of New Cast-iron Socket-pipe, 18 inch. internal diameter, in lengths to lay 12 feet each. Each piece weighs about 1,000 lbs. and has been proved at a pressure of 300 lbs. per square inch. Parties wishing to purchase the whole or a portion of the above, will please address, LOWELL GAS-LIGHT COMPANY, Lowell, Mass.— O. E. CUSHING, Agent. 7 6*

SCIENTIFIC BOOKS AND PERIODICALS, ENGLISH French, and American, in every department, in stock and imported to order, by the single copy or in quantity—offered by JOHN WILEY, 535 Broadway, New York.

☞ Scientific Catalogues gratis on application. 7 6eow

INCRUSTATION—A POSITIVE REMEDY AND NO injury. Satisfaction guaranteed. Send for circular. H. N. WINANS, 11 Wall street, New York. 7 4*

SCALE IN BOILERS—WE USED TWO POUNDS OF your Anti-incrustation powder, and were finally reduced to 1½ lbs., which keeps our boiler perfectly clean; size 26 feet by 40 inches. J. M. TURNER & BRO., Franklin, Ohio. Send for circular to H. N. WINANS, New York. 7 2*

NITROUS OXIDE APPARATUS.—THE CHEAPEST and best now used. Gas bags, tubing, pure nitrate ammonia and chemical reagents, chemical glass, &c., for Dentists, Teachers and Experimenters. Send for Catalogue. A. W. SPRAGUE, 89 Washington street, Boston, 6 2*

SCRAP IRON FOR SALE.—APPLICATIONS FOR THE purchase of scraps of the best Bloom Sheet Iron (from which spoons have been cut), and band iron, received by the subscribers. Several tuns weekly can be supplied. LALANCE & GROSJEAN, 278 Pearl street, New York. 6 2*

AMERICAN NEEDLE COMPANY, 442 BROADWAY, New York, J. W. Bartlett. Needle manufacturers for all the Sewing Machines. Bartlett's Burnished Hand Needles.

"We find Bartlett's Burnished Needles a wonderful improvement over others for sewing machine or hand sewing."—MME. DEMOREST. Hackle, Gill, Comb, Card Pins, &c., &c. 7 4*

MAGIC LANTERNS, STEREOPTICONS AND DISsolving View Apparatus with lime or oil light, and a great variety of Humorous, Statuary, Scripture or War scenes. A very large assortment of beautifully executed slides. A priced and descriptive catalogue of lanterns and slides furnished gratis and sent by mail free of charge. McALLISTER & BRO., 728 Chestnut street, Philadelphia. 1

THERMOMETERS!!! OF SUPERIOR FINISH AND accuracy, for the use of manufacturers, chemists, brewers, dyers, &c. Also register and standard thermometers manufactured by CHARLES WIEDER, Peterboro', N. H.

The trade supplied. 7 9 11 13 4*

EYELESS MINING PICK.—THIS VALUABLE INvention—patented May 12, 1863—see "Scientific American," page 348, Vol. 9, is for sale. Every miner ought to have them, and they will buy them if they can get a chance. Here is a chance for some enterprising man to make a fortune. Address for particulars the patentee, GEO. HOFFMAN, Scott Bar, Siskyou County, Cal. 6 3*

HOLSKE & KNEELAND, MODEL MAKERS, PATENT Office Models, Working Models, and Experimental Machinery, made to order at 100 Walker street, between Center and Elm, New York. Refer to Munn & Co., SCIENTIFIC AMERICAN Office. 6tf

---

FOR DEAFNESS.—SOUND-MAGNIFYING TUBES.—They enable deaf persons to hear at public assemblies—and can be concealed from view. Send for a pamphlet to E. HASLAM, 33 John street, New York.

PAINTER, GILDER, AND VARNISHER'S COMPANION.—Containing Rules and Regulations in everything relating to the Arts of Painting, Gilding, Varnishing, and Glass Staining: with numerous useful and valuable Receipts; Tests for the detection of Adulterations in Oils and Colors; and a statement of the Diseases and Accidents to which Painters, Gilders, and Varnishers are particularly liable, with the simplest methods of prevention and remedy. Eighth edition. To which are added complete instructions in Graining, Marbling, Sign Writing, and Gilding on Glass. 12mo., cloth, 75 cents.

☞ The above or any other of my Practical and Scientific Books sent by mail, free of postage to any address. My new catalogue sent free of postage. Address HENRY CAREY BAIRD, Industrial Publisher, 406 Walnut street, Philadelphia. 6 3

SALE OF CONDEMNED NAVY CANNON.

BUREAU OF ORDNANCE, NAVY DEPARTMENT,
WASHINGTON CITY, Jan. 18, 1864.

Notice is hereby given that on the 15th day of February next, at 12 o'clock M., there will be sold, at public auction, at the Navy Yard, Brooklyn, N. Y., and at the Navy Yard, Portsmouth, N. H., the following cannon, being 32-pounders of 61 cwt., known as "gradual increase," viz:—

One hundred and six (106) cannon at Navy Yard, Brooklyn.
Forty-six (46) cannon at Navy Yard, Portsmouth.

These guns are to be sold by the pound, and one-half the purchase-money is to be paid at the completion of the sale, and the other half upon the removal of the guns by the purchaser, which removal must take place within ten days after the sale, and at the expense of said purchaser. H. A. WISE, Chief of Bureau.
6 3 *

MARVIN'S NEW PATENT DRY-PLASTER AND and Alum, Fire, Burglar and Damp-proof Safes. (Patent issued Dec. 1, 1863.

We have received letters from the following eminent scientific gentlemen, proving their superiority over all others:

Prof. John Torrey, of U. S. Assay Office.
Prof. J. C. Booth, of U. S. Mint, Philadelphia.
Dr. A. A. Hayes, State Assayer, Boston.
Prof. A. H. Everett, New York.
Prof. Chas. A. Seeley, New York.
Dr. D. D. Parmelee, New York.
Messrs. Munn & Co., of "Scientific American."

MARVIN & CO., Sole Manufacturers,
No. 265 Broadway, New York.

Send for a circular with testimonials. 4 4

PORTABLE STEAM ENGINES—COMBINING THE maximum of efficiency, durability and economy with the minimum of weight and price. They are widely and favorably known, more than 300 being in use. All warranted satisfactory or no sale. A large stock on hand ready for immediate application. Descriptive circulars sent on application. Address J. C. HOADLEY, Lawrence, Mass. 5tf

---

J. E. STEVENSON & CO., MACHINERY BROKERS, Consulting Engineers, and Agents for the Introduction and Sale of Patented Improvements of all kinds, 200 Broadway, New York. 5 5*

PORTABLE STEAM ENGINES OF ALL SIZES, ON hand and built to order. Send for description and our prices, and get the best, cheapest, and most economical Engine made.
5 10 * HOAG & HAMPSON, 96 Malden Lane, N.Y.

WHAT EVERY ONE OUGHT TO HAVE—ONE OF Parr's Tool Chests, fitted with complete sets of tools, sharpened and set ready for use and packed in cases for shipping, suitable for mechanics, amateurs, farmers and boys. Prices from $2 to $35 each, and containing from 8 to 92 tools, according to size. To be obtained of all respectable hardware dealers or shipped on receipt of price by the manufacturer, GEORGE PARR, Buffalo, N.Y. Send for descriptive circular. 25 14*

THE NEW YORK EMERY WHEEL COMPANY ARE prepared to fill all orders for their improved Emery Wheels. Sample wheels sent on receipt of price as per circular. For cutting a grinding a wheel will save its cost in one day's work. Smyrna emery by the keg, warranted pure and best quality. Office 51 Beekman street, New York. 4 4*

JACQUARD MACHINES, WITH APPURTENANCES manufactured and put up. Looms for narrow goods, from silk ribbon to cotton tape, built to order on the most approved principles. W. P. UHLINGER, No. 1,621 North Second street, Philadelphia, Pa. 4 5*

WHEELER & WILSON'S HIGHEST PREMIUM SEWING MACHINES and Foote's Patent Umbrella Stands, 505 Broadway, New York. 17 26

PAGE'S PATENTED LIME KILN WILL BURN 300 bushels lime per day, with three cords wood or 1¾ iron coal, hard or soft. Address C. D. PAGE, Grand Rapids, Mich. 4 13*

DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C., Dec. 15, 1863.

To the Growers and Manufacturers of Flax and Hemp:

THE COMMISSIONERS APPOINTED BY THIS DEpartment, consisting of Hon. J. K. Morehead, of Pennsylvania, William M. Bailey, of Rhode Island, and John A Warder, of Ohio, to consider the following appropriation made by the last Congress, viz.:

"For investigations to test the practicability of cultivating and preparing flax and hemp as a substitute for cotton, twenty thousand dollars."

Having met, and after several days' investigation, believing that a further and fuller notice of their investigations might produce valuable results, adjourned to meet again on Wednesday the 24th day of February next, at 12 o'clock, M.

They request all interested in the distribution of this appropriation, or anxious to develop the subject for the public good, to send to this Department, on or before that day, samples of the hemp and flax in the different stages of preparation; of the fibers and fabrics prepared by them, accompanied by statements of the various processes used, and the cost of production in each case; also, descriptions of the kind and cost of machinery used, where made, &c., together with any and all information that may be useful to the Commission.

This information is necessary before an intelligent distribution of the appropriation can be made. ISAAC NEWTON,
1 9 Commissioner.

SAVING OF FUEL TO PARTIES USING STEAM.—DAMPER REGULATORS.

Guaranteed to effect a great saving in fuel and give the most perfect regularity of power. For sale by the subscribers, who have established their exclusive right to manufacture damper regulators, using diaphragms of flexible vessels of any kind. CLARK'S PATENT STEAM AND FIRE REGULATOR COMPANY, No. 5 Park Place, New York 24 26*

WOODWORTH PLANERS—IRON FRAMES TO Plane 18 to 24 inches wide, at $120 to $150. For sale by S. C. HILLS, No. 12 Platt street, New York. a

---

NERVOUS DISEASES AND PHYSICAL DEBILITY, arising from Specific causes in both sexes—new and reliable treatment, in Reports of the Howard Association—sent in sealed letter envelopes, free of charge. Address Dr. J. SKILLIN HOUGHTON, Howard Association, No. 2 South Ninth street, Philadelphia, Pa. 24 13*

A MESSIEURS LES INVENTEURS.—AVIS IMPORtant. Les inventeurs non familiers avec la langue Anglaise, et qui préféreraient nous communiquer leurs inventions en Français, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront reçues en confidence. MUNN & CO.,
Scientific American office, No. 37 Park Row New York

THE CHEAPEST MODE OF INTRODUCING INVENTIONS.

INVENTORS AND CONSTRUCTORS OF NEW AND useful Contrivances or Machines, of whatever kind, can have their inventions illustrated and described in the columns of the SCIENTIFIC AMERICAN on payment of a reasonable charge for the engraving.

No charge is made for the publication, and the cuts are furnished to the party for whom they are executed as soon as they have been used. We wish it understood, however, that no second-hand or poor engravings, such as patentees often get executed by inexperienced artists for printing circulars and handbills from, can be admitted into these pages. We also reserve the right to accept or reject such subjects as are presented for publication. And it is not our desire to receive orders for engraving and publishing any but good Inventions or Machines, and such as do not meet our approbation in this respect, we shall decline to publish.

For further particulars address—

MUNN & CO.,
Publishers of the SCIENTIFIC AMERICAN,
No. 37 Park Row, New York City.

OIL! OIL! OIL

For Railroads, Steamers, and for machinery and Burning. PEASE'S Improved Engine and Signal Oil, indorsed and recommended by the highest authority in the United States. This Oil possesses qualities vitally essential for lubricating and burning, and found in no other oil. It is offered to the public upon the most reliable, thorough and practical test. Our most skillful engineers and machinists pronounce it superior to and cheaper than any other, and the only oil that is in all cases reliable and will not gum. The "Scientific American," after several tests, pronounces it "superior to any other they have ever used for machinery." For sale only by the Inventor and Manufacturer, F. S. PEASE, No. 61 Main street, Buffalo, N. Y.

N. B.—Reliable orders filled for any part of the United States and Canada. 1 13*

CONES FOR UNITED STATES MUSKETS, ENFIELD and Austrian Rifles, and for the Shells of Rifled Cannon, promptly supplied in any quantities and warranted to pass Government inspection. Also second quality cones of above models, and cones for sporting guns and pistols. Address COLE, BROTHER & TILDEN, General Machinists, Pawtucket, R. I.

N. B.—Also manufacture every description of improved Reed Machinery. 3 10*

BISULPHIDE OF CARBON, CHEMICALLY PURE, for sale in quantities from one to fifty carboys. Address DUBOIS D. PARMELEE, Chemist, 22 East 41st street, New York. 1 13*

TO LEASE OR FOR SALE THE ONLY VACANT mill lot on Paterson race. For further particulars apply to G. SHIFF, 17 William street, room 27, up-stairs, New York, or to JAMES SPEAR, Paterson, N. J. 25 10*

A NEW PATENT DRIER—WHICH IS EQUAL TO the English, but much cheaper. QUARTERMAN & SON, 114 John street, New York. 22 3m

---

FAN BLOWERS—DIMPFEL'S, ALDEN'S, McKENZIE'S and others, for Steamboats, Iron Works, Founderies, Smith Shops, Jewelers, &c., on hand for sale by LEACH BROTHERS, 86 Liberty street, New York. 3 13*

VULCANIZED RUBBER—

Adapted to mechanical purposes—MACHINE BELTING, STEAM PACKING, VALVES, HOSE, EMERY VULCANITE WHEELS, &c., &c. Directions, prices, &c., can be obtained on application to the NEW YORK BELTING AND PACKING COMPANY,
Nos. 37 and 38 Park Row, New York.
JOHN H. CHEEVER, Treasurer. 1tf

GROVER & BAKER'S CELEBRATED SEWING MACHINES were awarded the highest premiums over all competitors at the recent State Fairs of New York, Vermont, Iowa, Michigan, Indiana, Illinois, Kentucky, Pennsylvania, Ohio, and at every Institute and County Fair where exhibited this year. Salesrooms 495 Broadway, New York. 19tf

---

GUILD & GARRISON'S CELEBRATED STEAM Pumps—Adapted to every variety of pumping. The principal styles are the Direct Action Excelsior Steam Pump, the Improved Balance Wheel Pump, Duplex Vacuum and Steam Pumps, and the Water Propeller, an entirely new invention for pumping large quantities at a light lift. For sale at Nos. 55 and 57 First street, Williamsburgh, and No. 74 Beekman street, New York.
1tf GUILD, GARRISON & CO.

BLACK DIAMOND STEEL WORKS, PITTSBURGH, Pa. PARK BROTHER & CO., manufacturers of best quality Refined Cast Steel, square, flat and octagon, of all sizes. Warranted equal to any imported or manufactured in this country. Office and Warehouse, Nos. 149 and 151 First street, and 120 and 122 Second street, Pittsburgh, Pa. vol 8 11 1y*

WANTED A STEAM-ENGINE AND BOILER OF 8 or 10 horse-power, in good condition, and economical for fuel. Address DAVID COON, Ypsilanti, Michigan. 2 7*

IRON PLANERS, ENGINE LATHES, DRILLS AND other machinists' tools, of superior quality, on hand and finishing, for sale low. For description and price address NEW HAVEN MANUFACTURING COMPANY, New Haven, Conn. 1tf

---

BOLTS, NUTS AND WASHERS OF ALL SIZES constantly on hand for sale by LEACH BROTHERS, 86 Liberty street, New York. 3 13*

WM. CLEVELAND HICKS, CIVIL AND MECHANICAL Engineer, 480 Broadway, New York. 3 tf

---

Zur Beachtung für deutsche Erfinder.

Die Unterzeichneten haben eine Anleitung, die Erfindern das Verhalten angibt, um sich ihre Patente zu sichern, herausgegeben, und verabfolgen solche gratis an dieselben.

Erfinder, welche nicht mit der englischen Sprache bekannt sind, können ihre Mittheilungen in der deutschen Sprache machen. Skizzen von Erfindungen mit kurzen, deutlich geschriebenen Beschreibungen beliebe man zu adressiren an

MUNN & Co.,
37 Park Row, New-York.

Auf der Office wird deutsch gesprochen.

Daselbst ist zu haben:

Die Patent-Gesetze der Vereinigten Staaten

nebst den Regeln und der Geschäftsordnung der Patent-Office und Anleitungen für den Erfinder, um sich Patente zu sichern, in den Ver. St. sowohl als in Europa. Ferner Auszüge aus den Patent-Gesetzen fremder Länder und darauf bezügliche Rathschläge; ebenfalls nützliche Winke für Erfinder und solche welche patentiren wollen.

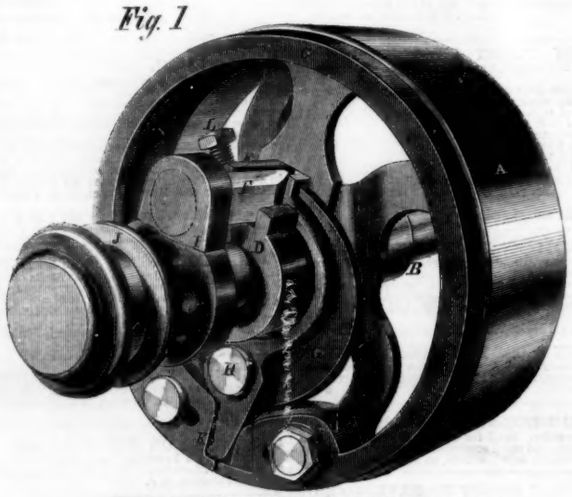
Preis 50 Cts., per Post 25 Cts.

Improved Friction Pulley.

The old-fashioned clutch coupling used in most machine-shops is one of the most annoying and inconvenient attachments that could have been devised for the purpose. It is simple in its construction, but noisy, violent in its operation and not at all reliable. Sometimes the revolving dogs fail to catch the spurs on the fixed pulley when the bar is thrown over, and the machine to be stopped runs longer than the operator wished, and in all likelihood spoils his work.

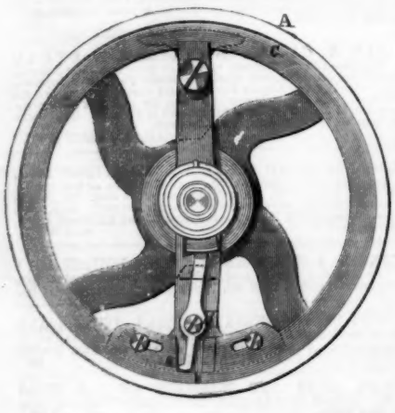
This improved friction pulley is open to none of the objections above mentioned, as it is simple in construction, noiseless in its operation (a very great point, by the way), and exceedingly efficient; these points everyone will concede who examines the accompanying engravings. The pulley, A, is loose on the working shaft, B, and is bored out slightly taper on the inner circumference of the rim; in this bored out portion, the wheel, C, fits. On the hub, D, of this wheel there are two short jaws, E, one of which is broken off in the engraving, which jaws carry a square bolt, F, between them; this bolt is slightly rounded on one end; the rounded portion bears against the end of a curved lever, G, which has its fulcrum at H. The other end of this lever bears against the lower side of a slotted part of the wheel, C. There is also a coupling, I, to which the bolt, F, is riveted, sliding on the shaft, B. The operation of this pulley is easily seen; when the shipper bar is set up in its place, one end of it embraces, by an obvious arrangement, the groove, J, in the coupling, and as this is moved along on the shaft, the wedge bolt, F, presses against the lever G, as at K, and throws it out against the loose end of the slotted friction wheel, C; this presses the latter tightly against the inside of the main driving wheel, A, and causes the shaft, B, to revolve; the wheel, C, being fastened to the shaft by two strong set screws, L.

Fig. 1



BURLEIGH'S FRICTION PULLEY.

Fig. 2



In Fig. 2 another plan of this friction pulley is shown, wherein the lever is straight and direct-acting instead of curved around the boss of the wheel; and we have presented both plans as an illustration of the invention. Concerning this pulley the inventor says: "The shipping fixtures are all fast on the shaft, and need no key or square spot; they can be bored out any size ordered, and to fit any old or new counter shaft. This pulley is a good thing to put in when repairing shafting. The work upon these pulleys can be done in the lathe and requires no new tools nor any planing, milling or key-seating, and is fully within the capacity of the most ordinary workman. It costs but little if any more than the old clutch, and less than any other new device. A single pulley with this friction clutch attached can be used instead of, and in many cases will do better than the common tight and loose pulley for starting and stopping machinery; and for sizes over 20 inches diameter, 8 inch face is no doubt much cheaper; it will also save the wear and side thrust in starting and stopping."

This friction pulley is the invention of Charles Burleigh, of Fitchburg, Mass.: it was patented on July 8, 1862, and has been assigned to the "Putnam Machine Company." For further information address E. C. Tainter, Worcester, Mass.

The Government Laboratory.

In Philadelphia there is a Government laboratory, at which are manufactured all the compounded preparations used in the entire armies of the United States. The work conducted there gives employment to about 225 hands, male and female. The manufacturing facilities provided here are a decided curiosity. The drugs are purchased in a crude state, and every specimen is tested by chemical analysis. The chemical and manufacturing apparatus, stills, &c., are all of the first order of excellence and completeness. So perfect are the resources of the laboratory that the glass stopper of the bottles are ground upon the premises, and the bandages for wounds are woven in the establishment upon spindles provided for the purpose.

The cellar is devoted to the storage and bottling of wines and liquors for medicinal purposes. Whisky, brandy and wines are the liquors employed. None but the best are procured. The last purchase of whisky was selected from twenty-three samples, of which the rest were rejected.

The first floor contains the analytical laboratory, the mill rooms and the packing room. The microscopes are of the most valuable character, and the balances adjusted with unerring nicety. The mill room has six mills, with bolting cloths and appurtenances complete. In these, crude drugs are pulverized and prepared for administration. A long one-story building behind the mill room is devoted to the preparation of tinctures and extracts; of these the production is enormous. The contents of the largest drug house would compare very insignificantly with the weekly production.

The second floor is a vast pill manufactory, where huge masses of mixtures are divided into globules by the delicate manipulation of soldiers' wives, widows and children. Plasters are also made here by the thousand, and about ten thousand bandages per day beside. The bandage-making apparatus is unique. There is nothing like it elsewhere in existence. This part of the establishment is exceedingly curious and interesting. It has saved the Government vast sums of money hitherto wasted, and gives to the physicians at all times remedial agents of reliable quality and standard.

Nothing is wasted by leakage or evaporation, and corks are discarded in favor of ground glass. The third floor is the filling department, where all the fluid medicines and powders are bottled. A dumb-waiter conveys them to the packing room below. Each bottle is packed in a separate paper box, surrounded by saw-dust. Breakage, therefore, is impossible. A fireproof building in the yard is appropriated solely to the distillation of ether and chloroform. Another long one-story building, in five apartments, is used for the preparation of articles requiring direct heat. Everywhere else throughout the building steam is used. The motor is an engine of twenty-five horse power. The whole concern is entirely complete and independent in itself, and is worthy of any nation in the world. A wash-house in the yard alone gives employment to eleven girls in washing bottles for daily use.

FROM THE STEAM PRESS OF JOHN A. GRAY & GREEN.